American Machinist

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ACCURATE CONTOUR TOOLING

A. L. Sinclair

Hawthorne Works, Western Electric Company

HIGHLY accurate contours are difficult to obtain under production conditions, more difficult if a high degree of finish is also desired. In the manufacture of the telephone switchboard plugs here described, a hand finishing operation was dispensed with and greater accuracy achieved by utilizing a five-spindle automatic screw machine.

This plug is made up of three kinds of material and machined under production conditions with tungsten-carbide and diamond tools. Service requirements demand a high degree of dimensional accuracy and a finish that is practically a polish. Because of these conditions and the design of the plug, made up as it is of a number of brass and rubber parts assembled on a steel center, this accuracy and finish is best obtained by contouring after the parts have been assembled and locked in position.

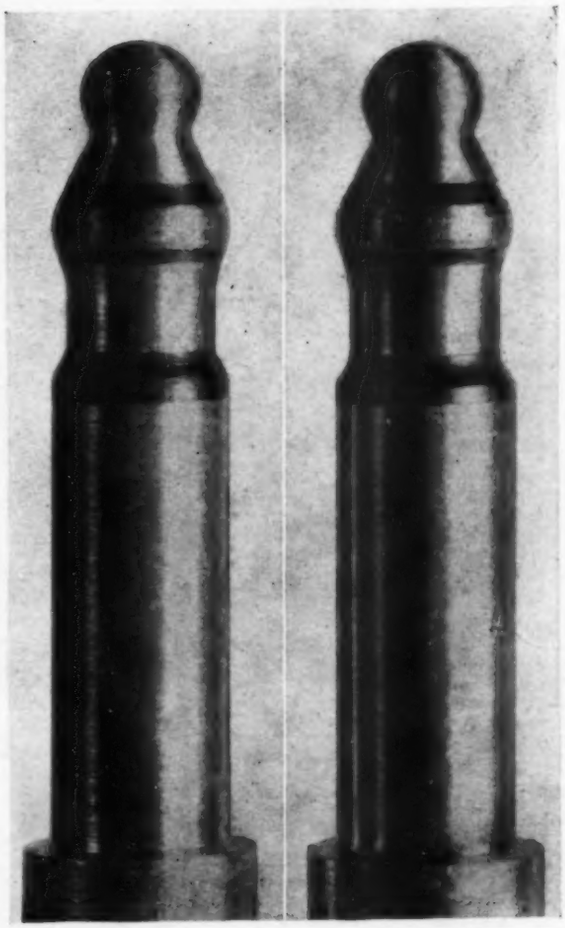


Fig. 1—A comparison of plugs produced by hand and by automatic screw machine

Contour forming was first done on hand screw machines with manually operated tools, results obtained depending entirely on the operator. Since all undersize pieces were practically useless unless rebuilt, and since their accuracy and finish were not all that was desired, a search was made for machines and methods that would result in a product with higher accuracy and better finish. After considerable investigation, a five-spindle automatic screw machine was selected that could be adapted to the requirements of the work. Subsequent tool development resulted in a radically different process of tooling.

The screw machine operator loads assembled blanks into a magazine. The machine removes a plug from the magazine, inserts it in the spindle, and chucks it in the first work position, as shown in Fig. 3. In the second position, Fig. 4, the piece is rough-milled to

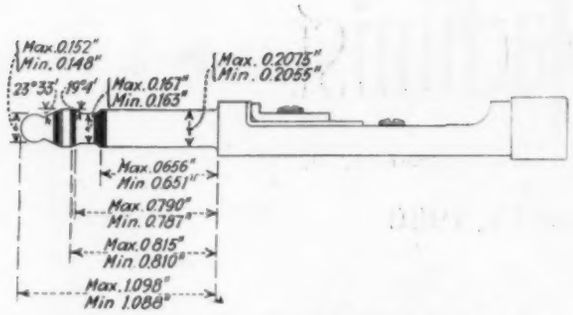


Fig. 2—Manufacturing limits on switchboard plugs

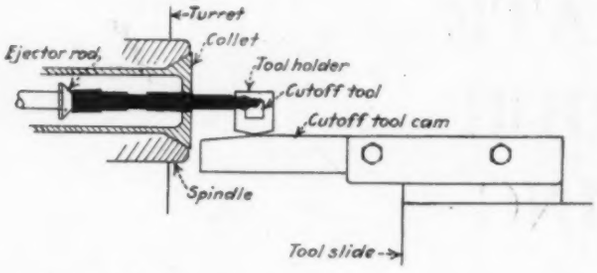


Fig. 3—Loading position

approximate shape by a form-milling cutter which leaves a few thousandths of an inch to be removed by a later diamond tooling.

During the indexing movement of the turret which carries the rough-contouring piece to the next operating position, it is passed through a safety gage having an opening of the same size and shape as the plug. If some parts of the piece are oversize as a result of being loosened or broken during rough milling, the gage swings to stop the machine and prevent the tools from advancing to the work. This safety gage, Fig. 5, is an important factor in the success of automatic contouring, for without it, oversize plugs would come to the diamond tools, not only causing tool damage but also a considerable loss of time in their replacement—with a consequent reduction in machine activity.

The operation following gaging, at the third work position of the machine, Fig. 6, is finish-contouring, using two diamond tools, one of which turns the straight portion and the other the irregular portion of the contour. The movement of the contouring diamond is entirely cam controlled.

In the fourth position, Fig. 7, the steel center of the plug, which has been used up to this time as a center for

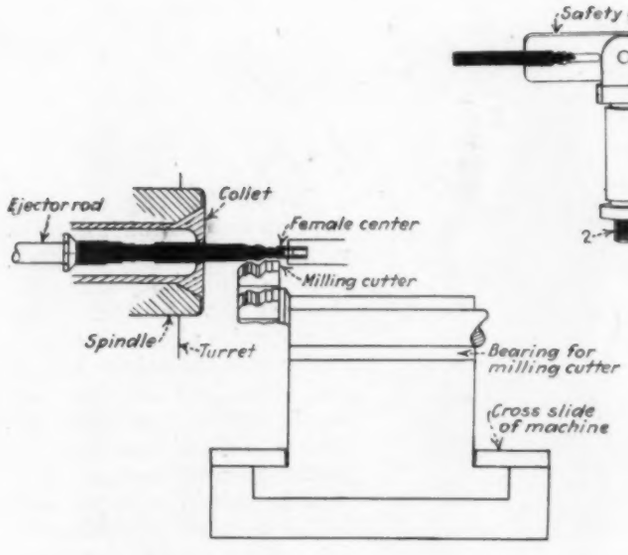


Fig. 4—Rough contouring position

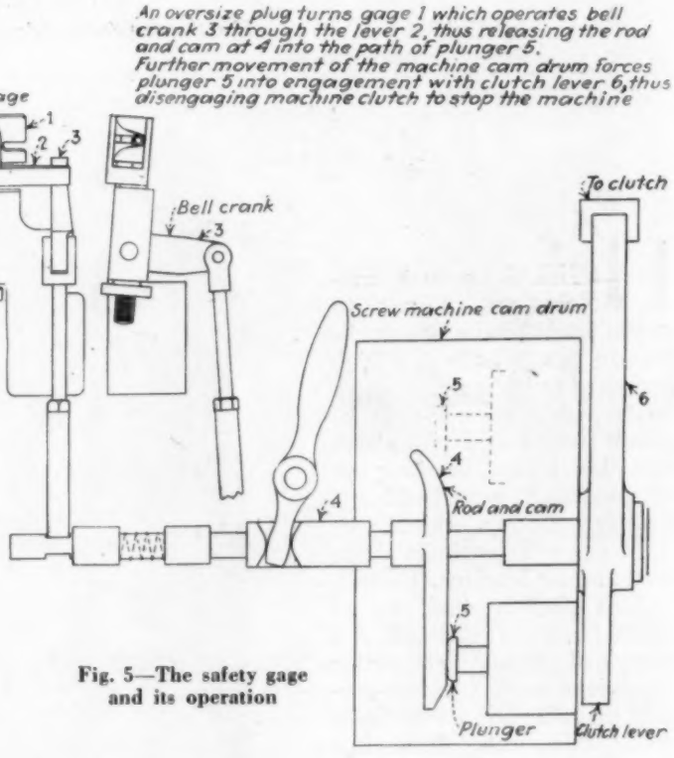

An oversize plug turns gage 1 which operates bell crank 3 through the lever 2, thus releasing the rod and cam at 4 into the path of plunger 5. Further movement of the machine cam drum forces plunger 5 into engagement with clutch lever 6, thus disengaging machine clutch to stop the machine
Safety gage
Bell crank
To clutch
Screw machine cam drum
Rod and cam
Plunger
Clutch lever

Fig. 5—The safety gage and its operation

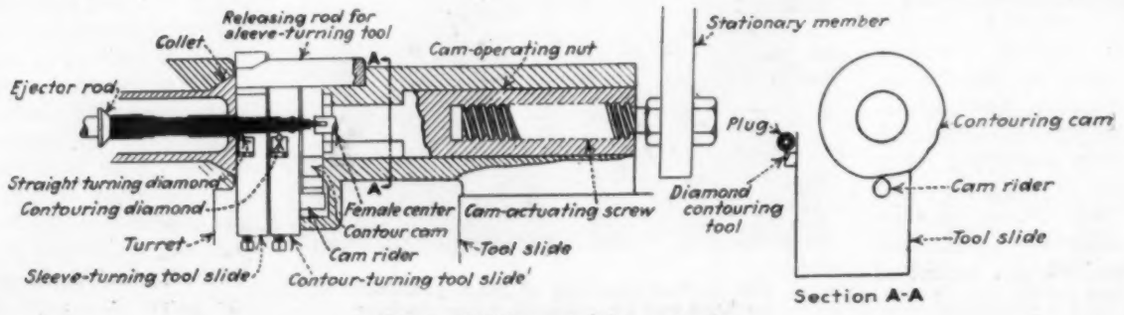
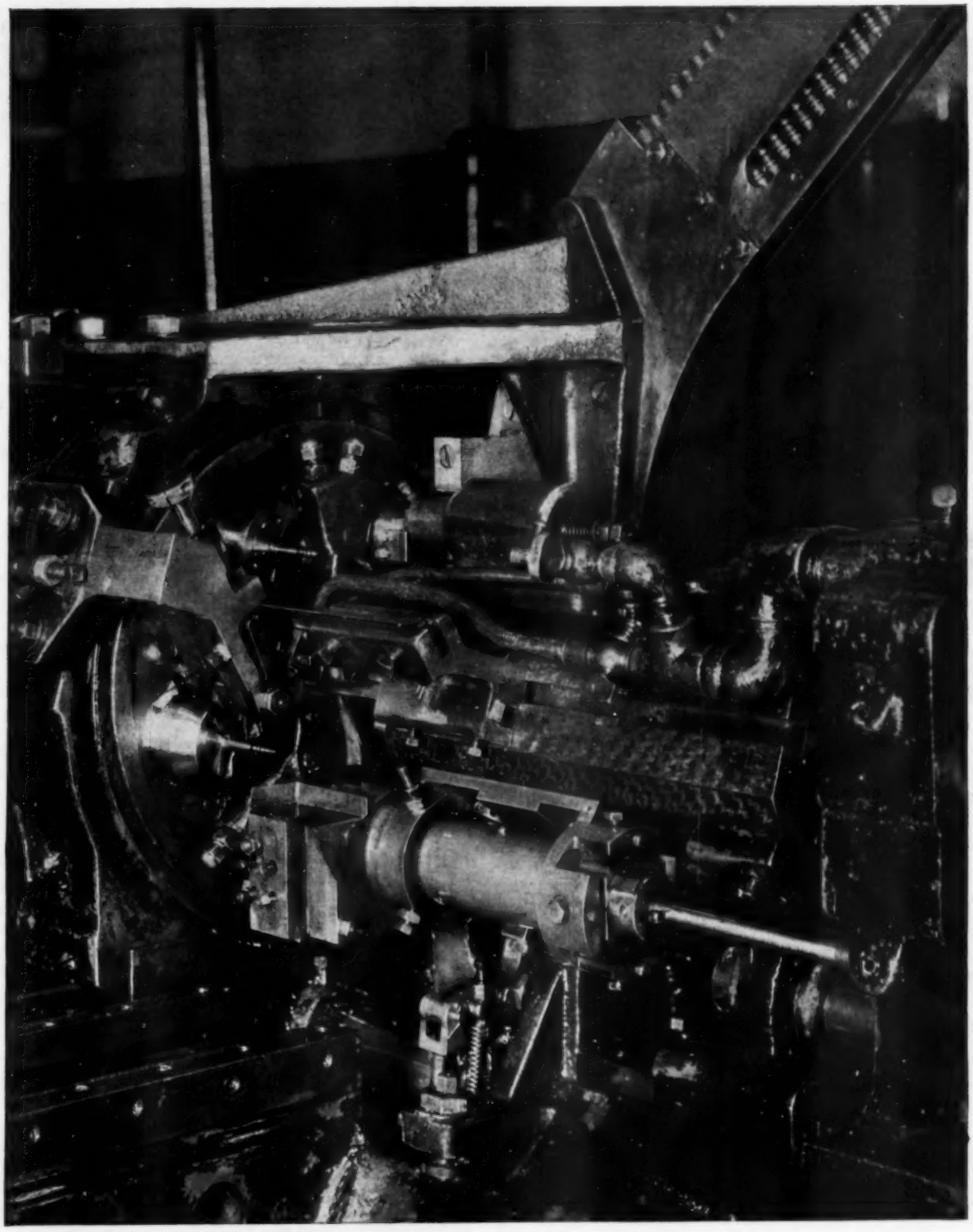


Fig. 6—Finish contouring operation



Automatic feeding, milling, gaging, finishing, and sizing — all centralized in one machine to contour telephone switchboard plugs

supporting the work, is cut off, and forming of the tip is completed by a forming tool. In the fifth position, not shown, the shoulder is chamfered slightly to remove burrs.

In connection with these operations, the following points are of special interest:

All centers, steady rests, and cam riders are of tungsten carbide. The ejector rod with its conical end acts as a rear center for the plugs during chucking of the parts. The form-milling cutter shown in Fig. 4 is driven from the standard drive ordinarily used for driving the threading spindle.

Motion of the contouring diamond to and from the plug, Fig. 6, is accomplished by holding the cam-actuating screw stationary while the rest of the tool moves with the tool slide, thus imparting rotary motion to the

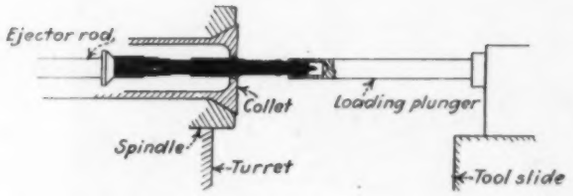


Fig. 7—Cutting off steel center and forming ball

cam, which in turn operates the contouring-diamond slide through the cam rider.

It is essential that no tool marks appear on the finished plug. Consequently, the diamond tools are moved away from the work by releasing rods at the end of the forward movement of the tool slide.

Spindles operate at 2,000 r.p.m. and the feed of the diamond tools is 0.002 in. per revolution. The time of the machine cycle is 13 seconds. Fig. 1 shows two plugs magnified five times, one contoured by the hand method and one contoured by the automatic method. The improvement in contour and finish obtained by the new method is clearly apparent.

■

Bulging and Flanging Shells—*Discussion*

A. B. FORMAN
Nottinghamshire, England

THE dies designed and made by C. H. Willey and his staff are certainly a credit to them. The shells shown on page 625, Vol. 72 are a good example of drawn work. Mr. Willey says he would like a description of how they would have made these shells in a big plant. I can assure him that with the exception of the first three operations, that is the blanking, drawing, and redrawing, the rest of the operations are done similarly to the way a shop with every facility would do them. He should have done the first three operations at one time, and not in a double-action press as he suggests.

Deep-drawn shell work is now better done in an ordinary combination die. In America you could use a Marquette pneumatic die-cushion, in Germany a similar device is made by Schulers; but the drawback with both of these devices is that you need a special outfit and a deep-thrown press. The cost of these, as Mr. Willey explains, would make them impossible in a small plant. I know that both these methods are used here in England, and are giving good results.

Over here we use another patented device called the Rhodes Simplex deep-drawing device, and having several of them working, we would have used one on the job shown. The shell would have been drawn in an ordinary combination die at one operation, thus cutting out the blanking and redrawing. This device could have been used on the press mentioned by Mr. Willey had the quantity justified it.

The device is fastened to the press in exactly the same manner as the rubber stripper. Its action is as follows: When the top tool meets the pressure ring, this ring acts on the pressure pins. These in turn act on the underside pressure plate attached to which are two racks. These racks work two small pinions, and these, being fixed, act on double racks on either side. As the outside racks descend, the inside racks rise, and lift the center block upward exactly the same amount as the pressure ring descends. The principle is that the pressure required to force the metal into the top tool reacts on the ring, thus keeping out all wrinkles. A deep-drawn shell can therefore be made in a shallow-throw press. The makers claim, and it is a true claim for I have seen the shells drawn, that they can draw in ordinary tin plate, depth for diameter. In the metal used by Mr. Willey, much deeper than diameter can be drawn.

A girl can draw about 6,000 to 7,000 cups per day of $8\frac{1}{2}$ hours, so the cost of this operation is very little.

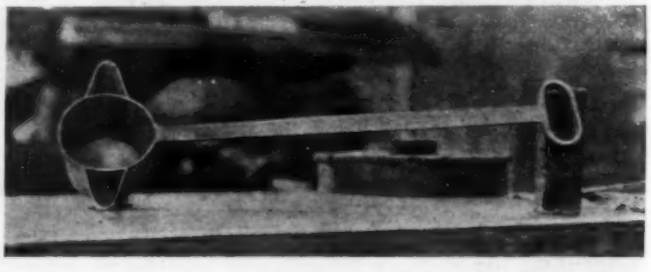
After drawing, the top would require trimming. Mr. Willey does not mention this operation. We should do this on a Bliss automatic trimmer. A girl could keep up with the cutting. We now have gotten the shell ready for the bulging. Here we should try doing this on a Bliss Beader. We have done jobs this way, but not so large a bulge as $\frac{3}{8}$ in., the largest being $\frac{3}{16}$ inch. Yet I think it could be done in brass. This again could keep up with the press. We sometimes use rubber for bulging, but our dies are much simpler than the one used by Mr. Willey. We use a split die, placing the rubber in the shell. This we place in the die, and a plunger enters the top and spreads the rubber, pressing out the shell to fit the split die. This, with us, is a very successful method, much quicker than it sounds. On slightly smaller work than the sample, we get 6,000 per day with a $\frac{3}{16}$-in. bulge. The rest of the operations we should do exactly as Mr. Willey did, and the costs would be the same.

■

A Handy Babbitt Ladle

THE WELDER in a New York hotel recently made the babbitt ladle shown in the illustration, and the hotel machine shop has found it very useful in pouring new bearings. The ladle has a long handle and two lips with a bottom feed. The molten metal is poured free from slag.

The lips were made from $\frac{1}{8}$-in. steel, heated by the blowpipe flame and forged into shape. The body was made by shaping a cylinder of $\frac{1}{4}$-in. steel with two holes cut near the bottom by means of the blowpipe. A bottom plate similarly cut out was welded into position.



The lips were then welded on as shown. The handle, heated and forged from $\frac{1}{4}$-in. steel, was also welded to the body.

The ladle is a useful piece of shop equipment, particularly where a great variety and number of machine bearings makes rebabbitting a frequent operation.

Constant Chord Gaging

Discussion

Sam Trimbath
Gear Engineer, The Willys-Morrow Company

HAVING been connected for over twenty years with the manufacture of gears, I am in agreement with Mr. Candee that the measurement over pins placed between gear teeth is both sensitive and reliable. In fact, we have much more confidence in this method of sizing gear teeth than in any other, and we sometimes wonder why this method is not adopted as a standard for spur gears.

In the old days, when a new job was started we very carefully ground the outside diameter of a gear to size, saw that it was true with the bore and that it ran true on the cutting machine when clamped in position. All of these precautions had to be taken if we were to size the gear with accuracy when using the vernier. Then after calculating the height of arc and chordal thickness and getting two of our best men to agree on the size with a tooth vernier, pins were placed between the teeth and a record made of the size. This was then used on all future gears of the same pressure angle, pitch, and number of teeth.

Troublesome as this was, it was preferable to determining the size by running on centers where variations in the size of bore and any eccentricity of the teeth affected the workmen's judgment. Further, by this method two gears had to be cut or else a so-called master (whose accuracy due to wear was always under suspicion) had to be used, and it was hard to get two men to agree when the gears were meshed just tightly enough.

The pin measurement eliminated all this, and because the measurement is taken across the diameter, it is at least twice as sensitive as the vernier method. In practice, we have found it to be about four times as sensitive, as two men will usually agree within 0.0005 in. when reading a micrometer which means well within 0.00025 in. on tooth thickness.

Some twelve years ago we derived a formula for calculating the pin size, and shortly after brought out a gear size chart for 14½ deg. and 20 deg. pressure angle teeth, giving the size for gears of 1 diametral pitch. The size for all other pitches is found by dividing the figures in the chart by the pitch of the gear to be gaged. This chart was distributed among our friends in the industry, and after receiving favorable comment, was sent as a contribution to the *American Machinist* and printed in 1925. It was thought that the merits would be obvious and no particular comment was made on its merits over other methods These were later pointed out in an article by Mr. Candee accompanying a similar chart printed in 1927. After Mr. Candee's very able presentation, it was hoped that the method of sizing gear teeth by measuring over pins would receive the consideration it deserved. Later comment, however, has made us doubtful that it has.

One reason may be that all pressure angles are not covered in the tables already published; therefore I am presenting a chart giving the size for 1 diametral pitch gears with seven different pressure angles. (See Reference Book Sheet in this number.) The chart is not large, and those numbers of teeth missing can be readily found by interpolation, while numbers greater than those listed can be found by adding to the last figure in accordance with instructions. This will cover everything within the range of micrometers. Even where an approximation is made in numbers of teeth greater than those given or with pressure angles falling between those given, the accuracy and reliability will be greater than for other methods of measurement in common use. One simple pair of rolls or pins per pitch, together with micrometers (which you can find in any shop) is all the equipment required to size accurately any number of teeth from eight on up.

■

Welding Copper and High-Copper Alloys—*Discussion*

Otto W. Schnetzler
Foreman, Brown, Boverie & Cie., Mannheim, Germany

IN CONTRAST to the experience of Ira D. Hook, as stated in the article on the above subject on page 595, Vol. 71, wherein he states that an oxyacetylene flame is best for welding copper, we have found that the oxyhydrogen flame gives best results. The heat developed by the oxyacetylene flame seems to be too high for welding copper, especially where small parts are concerned. Even an experienced welder finds difficulty in not overheating copper by keeping the torch in one spot too long. Porosity and brittleness resulting from overheated welds, as shown by our experience, seem to be largely overcome by using the oxyhydrogen torch.

A very important factor to be considered by the welder is that he should use as little oxygen in the flame as possible, ordinarily a great deal less than he would for welding steel. The use of too much oxygen in the flame will cause cuprous-oxide or cupric-dioxide in the weld, which will increase the electrical resistance, thus causing the welded parts to become heated excessively when in service. To offset this tendency, we are using "deoxidized" copper rod having a heavy coating of silicon as a deoxidizer.

EXECUTIVE FORUM

Sales Per Schedule

"SOMETIMES I envy you production men," said Frank Lyon, sales manager of the Mechanical Bearing Company. "You start an order in the shop, route it through the various departments, and schedule it for completion on a certain date. I know the system does not work automatically, and sadly enough, not always perfectly. But still it's a concrete basis of operation."

Bill Holland smiled at his visitor. Although a production man at heart, Bill's interest in industry extended to its sales activities; his advice had often aided the selling plans of his friends.

"I know what you're going to say," said Bill. "Selling is a hit-or-miss game, and at times you feel the lack of co-ordinated control—the works manager has means of knowing when his force is falling down, but in selling, the uncertain variables of business conditions becloud your picture."

"Exactly," agreed Lyon. "A production department at least knows when the shop is behind schedule and why. But I have difficulty in sorting valid causes for unattained quotas from plain alibis. Even when the sales force gets results, there seems to be a lot of lost motion."

"Then why not take your cue from the shop," Holland suggested. "Borrow some of its methods—do some scheduling with your sales force."

"But how?" Lyon asked. "You can't route a salesman around the country like a casting through the shop—and even if you could, you'd probably destroy his enthusiasm."

"It's being done," said Bill. "If your company is like most I know, 80 to 90 per cent of its business comes from 50 per cent of its accounts. Very often the additional 10 to 20 per cent represents a net loss. The cost of selling and servicing the small buyer is out of proportion to the business obtained. Send your salesmen out with a rifle instead of a shotgun."

"But a small account today may be a big one tomorrow," said Lyon. "Even the little fellow whose buying capacity is limited may grow and remember the firm that valued his business early in the game."

"True enough," said Bill. "You must base your plan on potential demand rather than present sales. But the principle still holds good. Classify the prospects in each territory according to buying power and limit your sales calls to the important ones. You'll find that you'll not only reduce your sales expense but secure more desirable business."

"I'm not sure that I agree with you," said Lyon. "A salesman should know his own territory best. Suppose he lands in a town to make one or two specified calls and has an extra hour or so on his hands. Why shouldn't he use that time visiting some small concerns not on his preferred list?"

"Given such leeway, your salesman will fall back into his present haphazard method," said Bill. "Encourage him to recommend new prospects and to give reasons why they should be visited. If desirable, they could be added to his list temporarily; but have your men obtain definite permission before making new contacts. The average salesman has little sense of proportion. To him any order is worth taking, regardless of the cost of securing it. If you decide on a selective selling plan, you must stick to your rules."

"It sounds too mechanical," said Lyon. "Selling is an intricate combination of personal initiative and intuition. I'm afraid any attempt to confine it to a set groove would be doomed to failure."

■

What Do You Think About This Problem?

Much has been said about improved methods of distribution. How far can manufacturing methods be applied to sales? Some companies tell their salesmen where to call and when. Are such rigid limitations on sales effort productive of better results? Or does reliance upon a salesman's individual resourcefulness bring out his greatest initiative? Other readers of *American Machinist* will be interested in your ideas on these questions.

. . . Discussion

of Executive Problems

■

Salesmen in the Shop

If there were any assurance that visitors would confine their questions to the foremen, the effect might not be so bad. Foremen could be expected to answer questions intelligently. Machine operators rather than expose their ignorance, or through an overzealous desire to please, may make statements which do not reflect the true conditions.

Mere inquiry about an order by an executive is sometimes construed by a man in the shop as instructions to proceed with it. New designs may make it advisable to exclude every one, except those actually at work on the new parts, from manufacturing departments. The knowledge that these improvements are about to be placed on the market, may influence the enthusiasm of the salesmen, so that older models are not pushed so hard as they should be.

The customer isn't particularly interested in whether his order is in the foundry, the machine shop, the paint shop, or still on the drawing board; what he really wants to know is when it will be delivered. This information should be obtained most accurately from the planning department. Keep the salesmen out of the plant unless personally conducted by a plant executive.

—Geo. T. Willson, *Assistant General Superintendent, De Laval Separator Company.*

Can Engineers Sell?

Few really good engineers can sell successfully without having a thorough sales training before going on the road. There are, of course, exceptions to all rules, and occasionally an engineer will develop into a salesman; but men of this type are so few and far between that sales managers are becoming very hesitant about putting an engineer out in the field unless he has had sales experience.

Most manufacturers of today are developing purchasing agents from men who have had manufacturing and engineering experience, and in order to sell to men of this type, the sales manager should recruit his men from the engineering department, and give them a course in salesmanship, or insist that his so-called natural salesmen receive a preliminary course in engineering.

The sales manager's theory is that the engineer having worked on the design of an article would certainly understand it thoroughly, and have no trouble in selling it. This mistake has proven very costly and the modern sales manager is demanding that his men be equal to the trained purchasing agent. —C. F. Staples.

Concentration or Confabulation?

Where the foremen report directly to the works manager, there should be unlimited communication; but it should be tempered with judgment and concern mainly the company business. The proper place for the manager and the foremen to get personally acquainted and to understand one another better is outside the shop. Removed from his business, the manager is more inclined to be his natural self. It invariably happens that the foreman will talk shop and be more open in his conversation with the works manager during these outside visits. There is a feeling of equality there, which four shop walls do not create.

When the works manager makes his morning rounds of the departments, business will be the main topic with a word or two of outside talk. Any problems, which are brought up during this morning round, can be solved later by the works manager in his office, or the foreman can be brought in and a combined attack made when necessary. The contention that an executive should have personal contact with those under his supervision still holds good; but the works manager should have a superintendent or two placed between him and the foremen. These superintendents should filter out the small talk and bring only the useful conversations to the works manager.

—E. E. Gagnon, *Mechanical Superintendent, Raybestos-Manhattan Company.*

Too Much Specialization?

Such situations are caused by a lack of sense of humor and common sense, which unfortunately do not always seem to be the complement of management. The breaking down of duties may be carried from the sublime to the ridiculous, and if we let ourselves slip into the whim of such management, why not have one operator place a blank in the press, another trip the clutch, while another removes the work? Each of these individuals would no doubt become very efficient but also a darned nuisance, especially if one could not pinch-hit for the other.

Every plant of any size should have a plant engineer, master mechanic, or maintenance superintendent, with authority to deal with such situations, and to prevent these embarrassments by removing the punchings on a schedule, or by supplying men to clean, without the use of machine operators. Such a man would be actively in touch with the situations arising from the imaginary lines of demarcation between jobs, and could order red tape cut before snarling occurred. Too much functional activity is worse than none at all.

—John S. Isdale, *Plant Engineer, International Silver Company, Factory "K".*

Inspection or Discretion?

In order to obtain the desired results, inspection should be distinctly separated from production. Inspection should be under the jurisdiction of the engineering department, and questions of rejection ruled upon by the engineers.

Fundamentally, inspection is a mechanical operation to determine if parts are within certain tolerances or

assemblies meet definite requirements. If they conform, they should be passed by the inspector. If not, there are several alternatives that must be considered. If an operation has been omitted, they are returned to the shop for completion. Parts which are outside of the specified requirements may still be usable or reworked. Either of these possibilities should be decided by the engineering department.

The engineer who is responsible for the design specifies limits and requirements that in his opinion and experience are necessary to produce a satisfacory product. These limits should, of course, be tempered by fabricating and production conditions. If experience shows that limits are too wide or too narrow, they should be called to the attention of the engineering department and adjustments made accordingly. Wrong limits have such a decided influence on manufacturing costs that their correction is vital to all concerned. —F. J. MAUS.

How Much Incentive?

In allowing the employee one hundred per cent of his bonus under the Halsey plan, let us remember that it is much easier to raise a rate than to cut it. As all such rates are set on approximately 75 per cent guess-work, there is always the chance that they may be way off. If they happen to be loose, then the management has to cut to keep the costs and earnings where they should be. It certainly does them no good to be known among the employees as rate cutters, for if a man gets a loose rate he will stall and protect it. If a rate is too low, resetting establishes confidence in the management. Whether a rate is high or low, the management is protected under the 50 per cent bonus plan.

Although I am not in favor of the Halsey plan, we here at this plant have one department that handles specialties, parts, and items that very seldom repeat where we use the Halsey 50-50 plan. It works out very well under these conditions, but it would be an absolute failure as far as being a money saver goes under the full bonus plan.

—CHARLES R. WHITEHOUSE, *Standards Engineer, The Holtzer-Cabot Electric Company.*

The Urge to Merge

A merger of small shops, operated by individuals, has so many disadvantages that the safest course would be for each to concentrate their efforts in their particular fields. The combination would tend to increase overhead costs, as with the larger concern more system is required necessitating clerks and added facilities to accommodate them. There is a general let-down of enthusiasm and effort. The personal element creeps in where each man analyzes his associates' efforts and duties. Sooner or later disputes arise as to the quality and amount of work each is doing. When propositions are gone over there must be a consultation as to how it should be done and again each man compares his ideas with his associates', which is likely to cause criticism, resulting after a period in dissolution. The combined shops cannot render the personal service which most frequently induces placing orders with the small shop, so that chances of greater business through combination do not always materialize.

On the other hand, mergers of large corporations have invariably resulted in economies through mass production and reduced overheads with greater purchasing power. Combination of the small shops does not put them in the class of the big fellow, but leaves them in an intermediate position, which is dangerous.

—JOHN J. BURKE.

Square Deal or New Deal?

All know the upheaval possible through changing a small group of staff workers; it should therefore be done only as a last resource. Experienced men in any capacity are valuable, and it would be foolish to remove them lightly. Infringement of rules, loss of time, neglect of duty, and rudeness are often ignored rather than take drastic action and so upset the routine.

But there is a limit; forbearance can be carried too far. When it comes to this, steps must be taken, and it may not prove so inconvenient as imagined. Many years ago, in a large firm, a new manager found he was not getting the co-operation desired from the staff. Consequently, he gradually cleared some of the foremen, one by one, filling the positions with adaptable men from the shop. The change hardly caused a ripple, and the manager molded these new foremen to his ways. In a year or two, things were running smoothly. —WILLIAM BRYCE, *Sheffield, England.*

Wholesale or Retail?

Because there are fewer large concerns in England than in America the amount of articles bought at wholesale prices by employees is less. The small firms, personally owned, rarely allow their names to be used for the purchase of goods, although a certain amount of purchasing is done surreptitiously.

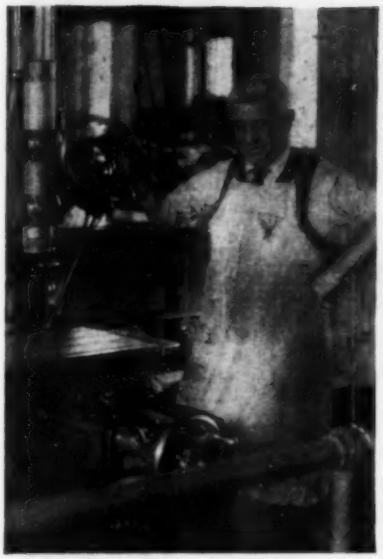
There is no doubt, however, that this method of purchase is growing rapidly, as the welfare departments of the big companies find new scope for their activities which have been exhausted by the provision of sports and recreations. I am aware of several firms who make a speciality of arranging for the supply of furniture and like commodities which go to the making of a home. One at least offers to loan money for cash payments so as to eliminate the time purchase system. Weekly deductions are made from salary, and the borrower is not allowed to involve himself to an extent which might prove disastrous.

Continual growth of this wholesale-retail business must affect the prosperity of the small dealer but only harm would result if an attempt were made to stamp it out. A compromise would seem possible in many cases. For instance, quite a large percentage of firms manufacture goods of direct value to the individual worker. Gramophones, radio sets, electric lamps, vacuum cleaners, household utensils are but a few of the articles necessary to home life. Firms producing such wares would all do well to make their purchase easy for employees.

I am associated with a gramophone company which makes every concession to the workers. Of course, there has to be some safeguard against the abuse of the privilege. Thus each employee is allowed to purchase not more than four records per month which, I think a very reasonable limitation. —C. B. GORDON-SALE, *Shefford, England.*

398 YEARS *of* SERVICE

Veterans with the company, these eight men were honored guests at the recent Seventieth Anniversary observances of the Pratt & Whitney Company



HENRY D. HINCKLEY (Above)
32 years intermittent service
Oldest P&W apprentice

AUGUST F. BRAUN (Above)
39 years service
Second oldest P&W apprentice

WILBUR M. GLADDING (Below)
48 years service
Gear cutting department

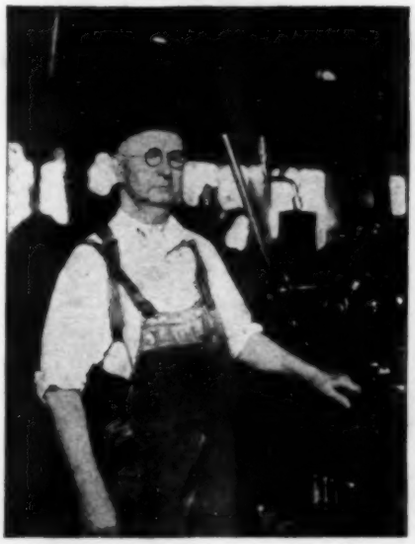
FLAVEL L. WOODWORTH (Right)
63 years service
Machinist

EDWARD F. O'BRIEN (At Left)
48 years service

JEREMIAH H. COFFEY
63 years service
Both in forge shop

Mr. Coffey has two sons with the company, John F., and Thomas F., with 31 and 20 years service, respectively

JOHN B. HENRICHON (Below)
50 years service
Inspector



EUGENE F. LAPORTE (Below)
55 years service

TWO TYPES of INTERMITTENT FEED

CHARLES F. SMITH
Consulting Engineer

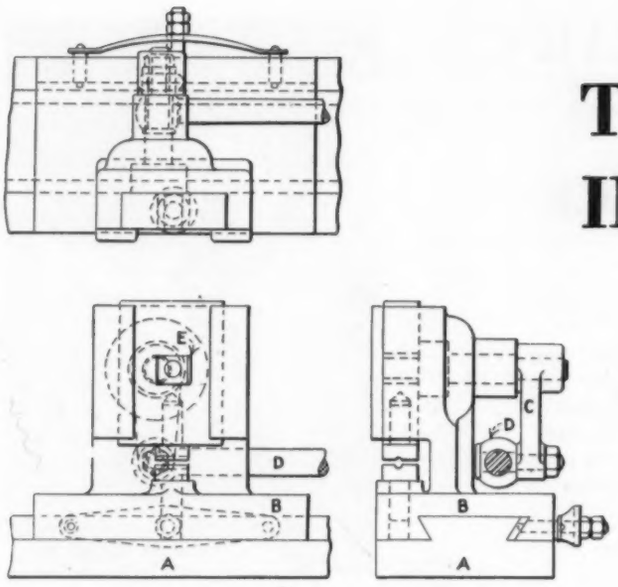


Fig. 1

A SIMPLE form of intermittent feed for small rods is shown in Fig. 1. The base *A* is fastened to the machine, while the slide *B* carries the gripping dies and also the crank *C* which is actuated by rod *D*. Rod *D* has sufficient movement to close the gripping dies and to move the slide the required distance. The gib of the slide must be tight to hold the slide until the arm *C* has forced the dies into contact with the rod to be fed. The crank moves the upper die by means of a vertical slide through the lug *E*. On the return stroke this lug lifts the slide and releases the rod. The continued movement of slide *B* permits the rod to slip through the dies while the slide assumes a new position before the next feeding movement.

Holding work for an operation, feeding it, and holding it again for another operation is usually done with a dial feed of some sort. The device in Fig. 2, however, does the same thing in a straight line. A long stationary jaw *A* has grooves for 8 rods to be operated on continuously by some kind of revolving tool, such as a drill, hollow mill, tap, or die. Eight movable jaws above, as at *B*, clamp the pieces separately before the tools go into action. The stock can be fed into the first jaw by hand, or by roll or magazine feed.

In the center of the stationary jaw *A* is a feeding slide, shown in Fig. 3. During the operations on the piece this slide is out of the way below the holding jaws. The feeding slide consists of two parts, one of which is raised by the bell cranks *C* to lift each piece of work out

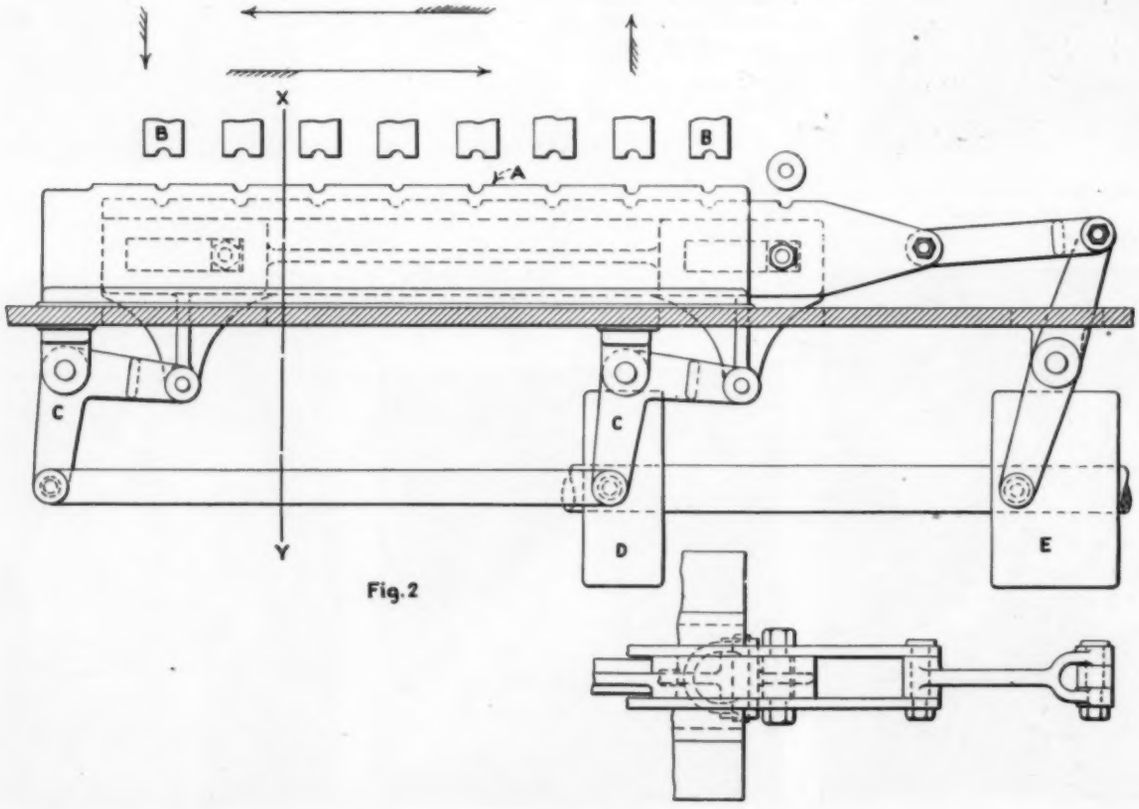


Fig. 2

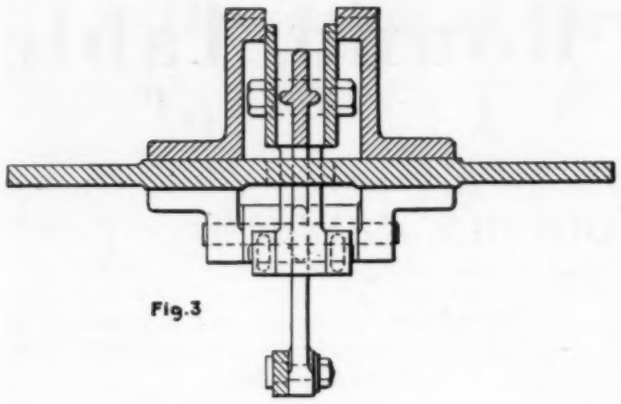


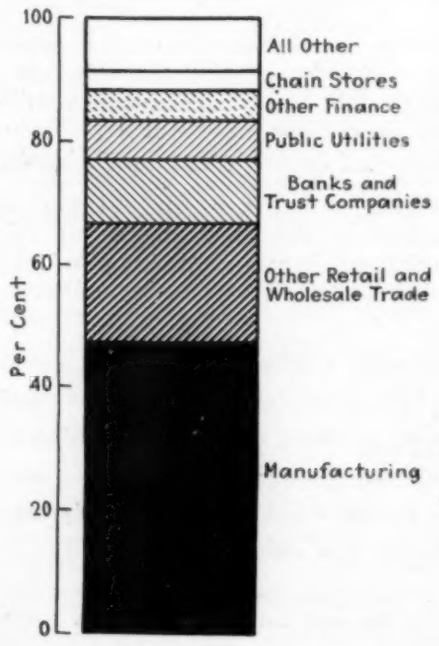
Fig. 3

of the jaw *A* and the other to move the slide endwise enough to carry a piece from one station to the next. Both the lift of the bell cranks and the end movement are secured by cams as *D* and *E*. With these movements properly timed, the clamping jaws release the 8 pieces of work and the slide lifts them out of the fixed jaw, moves them one notch, and deposits them in the next notch. The finished piece is dropped out, a fresh blank is fed into the other end, the transfer bar drops out of the way, the clamps lock the work, and the tools go to work once more. The number of clamping notches and jaws can be increased or decreased to suit the job in hand.

■

What the Community Chest Costs the Manufacturer

OF THE nearly $13,000,000 contributed by corporations to 129 major community chests in 1929, 47.2 per cent came from corporations engaged in manufacturing, according to a study entitled "Corporation Contributions to Organized Community Welfare Services," by the National Bureau of Economic Research, Inc. Comparative amounts contributed by various industries are shown in the accompanying chart.



Are Machine Tool Salesmen on the Job?

JOHN R. GODFREY

YOUNG Tom Johnson hasn't quite the same picturesque vocabulary as the Old Man, but he has a lot of horse sense and is a rather serious minded chap for his years. I dropped in the other day as he was concluding a deal for a new turret lathe.

As a salesman—or shall we say sales engineer?—walked out Tom said: "Now there's a man and a firm I like to do business with. They charge a high price for their machine but they know what it will do and there's no guess work about their guarantee. They don't make rash promises about performance but tell you what it will do with certain materials, certain tools, and with a good man on the job."

"Didn't offer you a discount to get the order, in view of the state of business?"

"Not a cent, Uncle John. You never waste time arguing with him about price and you never have a sneaking suspicion that some other fellow got a better discount."

"Then I judge they don't all stick to prices, eh Tom?"

"I'll say they don't, Uncle John. But that isn't all. Darn few of them seem to care whether they get any orders or not. They seem to think there isn't any business to be had and they don't even try to find out. Why I had a heck of a time trying to buy a new machine last fall, after the smash. Just when you'd think they would all be keen to grab any order, no matter how small.

"I sent a couple of good men out to the machine tool show in Cleveland last fall and they came back all pepped up about new machines. One of them we wanted right off the bat. So I sent to the agent for circulars and information—and then I waited. After writing twice I got a circular that didn't tell much. Then I called up on long distance and tried to get someone interested in selling it to me, but I couldn't get a rise out of them. Not a salesman came near me, and I only got one snippy letter in reply."

"Finally we decided to take a chance on the machine anyhow and wired in our order. Even that didn't jar them loose for a month. I guess they hadn't come to, after thinking how much they would have lost if they'd had any stock when the market broke. But it finally came and it's a peach. I believe I could even sell them myself and in these times, and I'm a rotten salesman at that."

I had to admit it didn't sound so good for the efforts of machine tool salesmen. But, unfortunately I'd heard similar tales before, so I wasn't too much surprised.

"I often wonder how they sell enough tools to pay the office rent," went on Tom. "And even the district offices aren't all hundred-per-centers by a long shot. I frequently have to talk to the real big chief at the factory by long distance, before I can get action.

"One of the salesmen in this district volunteered to split his commission on any order I gave him. And even he never tells me of any new machine I might like to know about, nor does he act much interested in inquiries I send him. I know most machine tool builders need orders, but nearly all of their men, in this territory at least, seem to have sleeping sickness. I'm not talking about some little, insignificant concerns either."

The Foreman's Round Table

CHECK AND DOUBLE CHECK

"HELLO. That you, Al? This is Ed speaking. Say, is there any reason why this department can't borrow the 6-in. mike? Do you people claim to own it?"

"Wait a minute, Ed, wait a minute. What 6-in. mike are you talking about, and who has it?"

"I am talking about the 6-in. mike that belongs in the tool crib—the one that Bill Scott has. I sent a man over for it and Bill refused to let him have it."

"All right, Ed, I'll go out and talk to Bill and then call you back. Good bye."

After talking to Bill Scott, Al went over to Ed's office to continue the discussion. "I can't see that Bill Scott is in the wrong, Ed. He has the mike out on check and is using it every little while on oversize pistons. He seemed to think that your man might use a snap gage."

"That hasn't anything to do with it, Al. He did use a snap gage with a feeler, but the idea is that your department ought not to have a monopoly on tools—or anything else for that matter."

"We haven't Ed. But we have a right to use a tool as long as we need it. If it's kept longer than that, my job is to correct the matter. I think, however, that instead of your man running over to my department, or your calling me up, you should get after the tool crib. Then, if they have enough calls to justify another one, they will get it. This way only causes confusion."

"That sounds all right, Al, but what we are going to get don't help me one bit. This firm is big enough to have two 6-in. mikes."

"Maybe it is, but it isn't big enough to have two of everything. It is seldom that we have a mixup of this kind."

"I don't know about that, Al. It seems to me we have them all the time, and it gets my goat. Only the other day I had two men scrapping over a high-speed cutoff tool. One man got the last one out of the tool crib, and a half hour later another man called for the same kind of tool. The tool keeper told him that he could not order any more made until he had some old ones to turn in and that the man had better borrow the one Joe Smith just got out. Joe wouldn't lend it because he claimed he had gone to the trouble of fixing it up. I had to borrow it and agree to return it personally. I can't do that all the time."

"Well, maybe in that particular case the tool crib was shy, but I'll bet that you and I both can find fifty cutoff tools lying around our departments."

"I don't doubt it. But every time I go around and collect the extra tools a man has, he kicks, and then some one remarks that I am always doing something to make the men discontented."

"It is a problem, Ed, but we can't let men swap checks, and we can't carry an excessive small-tool supply. So that puts it up to us."

"Yes, it's always up to us. It seems to me that every time we lay down a rule to cure one trouble, we raise two more difficulties that we did not have before. It just adds another straw to the foreman's burden."

"Yes, Ed, but don't forget that the heavier the burden the foreman carries, the fewer candidates there are for his job."

How can the small shop strike a balance between an excessive tool supply and a lack of tools? Would it be good practice, in a small shop, to check out lathe and planer-type tools? Why should we demand the return of small drills, which are cheap, and give out indiscriminately tons of expensive steel in the form of cutting tools?

Idea suggested by Charles R. Whitehouse,
Standards Engineer, Holtzer-Cabot Electric Company.

▸ ▸ ▸ Discussion of Former Topics

Who's Who in Industry

No system of piece work can rightfully be applied without the installation of suitable base rates compiled by job classification or job analysis. Under the plan suggested all jobs are rated according to the skill required and the energy demanded, also taking into account the conditions surrounding the work. In some cases jobs are classified as to wet or dry, sitting or standing, etc. Job classification assures all men doing similar work throughout the plant a chance to earn equal amounts. No one will disagree with the fact that a skilled mechanic should receive more pay than an unskilled operator, or that a worker employed at a furnace should receive more wages than an operator at work which is done under more favorable conditions.

Those who have worked under conditions where each foreman set piece work prices at his estimate of what the job was worth, will remember that the prices were usually a reflection of the foreman's character. If you were fortunate enough to work for a foreman who was a good fellow you had good prices, and if otherwise, you had prices set accordingly. This condition often resulted in operators on smaller work throughout the plant having wages which were not consistent, with consequent dissatisfaction. Job analysis has cleared the air of this trouble and should certainly be in use in all plants operating under a piece-work system. —ALEX CADDIE,
Hamilton, Canada.

From Another Angle

It seems as unusual that we should be asked, "Why do they use third angle projection instead of first?" as it would be to hear, "Why did you take your week-end trip in a motor car rather than behind a horse and buggy?" Undoubtedly first angle projection was developed on the theory that it was the correct manner to make the various projections, and while it evidently is a correct theory from an academic standpoint, the simplicity, directness, and consistency of third angle projection commends itself to every practical mind. The natural placing of the various views according to the third angle system, wherein the top view appears above the front view, the bottom view below, the right side is placed at the right, and the left to the left, is so satisfactory from all practical considerations that it seems as though only one reason can exist for still desiring the use of first angle—that it is a little easier to keep on wearing a pair of comfortable old shoes than it is to buy and break in a new pair. However, it must be remembered that first angle was the earliest form of projection in common use and was at one time used exclusively. It is still favored by British draftsmen, if we are to judge by such of their shop drawings as come under our observation, but practically all drafting rooms in the United States, excepting possibly a few controlled by foreign policies, use the third angle method entirely.

The writer does not agree that draftsmen visualize a part as though it were made of folded paper, as Al intimates. Draftsmen and designers of experience do not think via folded paper, at least not when they use third angle projection. Neither does it seem likely that, in the shop referred to as having changed from first to third angle, this was done to save the poor nerve-wracked draftsmen from deplorable errors and delays, but rather to make it better and simpler for every one concerned. There is only one thing about third angle that may prove at all confusing, this is the explanation as to why it is termed "third angle." If Ed, who seems a bit perplexed on this matter of projections, will just forget all about the theory and simply remember to act natural, all difficulty will disappear. If you are looking at the drawing of a rectangular base for a machine, for instance, and desire to see what the right end is like, simply look at the view directly to the right. If the front view is very clear, but you are not sure about the top and bottom views, just remember that the top view will be above and the bottom view below. Then you can keep your hands in your pockets, while looking over drawings.

Much more thought has been given to making drawings clear, definite, and readily understandable than either Al or Ed apparently realize, judging from their conversation. If drawings for shop use are properly made, there should be no difficulty whatever in comprehending exactly what is required, unless the drawing is unavoidably involved on account of the presence of unusual conditions. This of course must be expected occasionally, because, in various mechanisms, there are instances where it is desirable to combine a number of features into one integral unit. This may be for strength, economy of manufacture, permanency of alignment, or for other reasons. Naturally the drawing of such a part will tend to be somewhat complicated, if full information is to be given thereon, and will require a little study to make entirely clear. But so will a road map or a time table.

Nevertheless the fact remains that many draftsmen fail to recognize some requirements very essential to making drawings that will be quickly and correctly understood. The points following are slightly condensed from rules in use in our designing and drafting departments, and have for their main object the production of drawings so clear and plain that, "He who runs may read."

Third angle projection to be used exclusively.

Number and position of views of detail to be such as will most clearly show construction. On turned details, show the part, as a rule, in the same position as it will be held during the principal turning operation. Thus the side view will usually be drawn with the largest diameter to the left, and the end view will be placed to the right.

Dimensions giving location of all kinds of holes to be placed where the hole appears as an end view. Unless the location is of but little importance, the dimensions

of the same are to be given directly from the functioning surface or position.

Diameter of hole and data concerning it, will be placed just outside of detail outline, in view where hole shows as an end view, and will be connected with hole by an arrow-line, with arrow just touching hole circle. Holes 1½ in. and over in diameter may have size designated by diagonally placed dimension line inside hole circle. The only exception to dimensioning holes in end view is that of combination holes which may include various sizes of drills, reams, taps, or counterbores, in which case greater clearness is obtained by dimensioning in the side view, still retaining the arrow-line for giving the diameters.

Overall dimensions to be placed outside of all other dimensions, preferably above and at right side. Dimensions of rounds, squares, flats, hexagons, etc., to be given above end view.

Avoid all unnecessary odd dimensions. Don't introduce 64ths and 32nds unless indispensable. Don't use 16ths if 8ths are close enough, 8ths if quarters will do, and whenever possible, express overalls and general dimensions in quarters, halves, and even inches.

Intelligently selected dimensions will help a great deal more than figures supplied at random. Dimensions for all important operations must invariably be shown from that particular surface or location most directly involved.

All dimensioning must be clear and distinct in every respect. Loops on figures and letters must be openly formed, and every character and every line must be of sufficient size and intensity to insure legibility on dirty blue prints.

Parts that are unlike will in every case have a different part number, no matter how minor the variation. This does not prevent using the same view to show both parts, as it is entirely acceptable to specify the desired quantities of each, designating the differences by using keyed letters.

Left hand threads and other departures from regular practice must always be made extremely distinct, so that in no case can an error made in the shop be the result of lack of clearness in the drawing.

Neatly arranged and properly spaced views contribute greatly to the clearness of a drawing.

In cases where a number of dimension lines run parallel with each other, always place them at equidistant intervals (eye spacing should be good enough). Also see that the space between the detail outline and the first dimension line is a little greater than the others.

Do not stagger dimension lines which run in opposite directions from a common reference line. This causes a disorderly appearance. If arrow heads are distinctly made, two oppositely directed dimension lines may meet on a reference or center line without detracting in the least from being defintie, and will also contribute to the general clearness of the drawing because the method is neat and orderly.

One of the greatest aids to making shop drawings that stand out clearly is that of showing, as such, all little rounded corners and small fillets, representing the judicious breaking of all corners not required to be absolutely sharp. No dimensions are given, and they are all put in free hand, taking no more time than drawing with sharp corners.

In making the above suggestions to Al and Ed et al., relative to the question of making drawings that are easy to read, the writer realizes that he probably has written at too great a length; in other words he has been speeding along on one of his hobbies, clear drawings. Are two-color prints necessary, or even advantageous? No, not if the draftman's hand, eye, and mind are properly co-ordinated, and he has carefully studied the subject that is of first importance to him, making clear drawings.

—Arthur W. Suiter, *Chief Engineer, Liberty Tool & Gage Works, Inc.*

Do Errors Cancel Each Other?

From the president down to the man who sweeps the shop, all fall short of perfection, or in other words, make mistakes. When noticed, the president's mistakes are called errors of judgment, and only his wife or irresponsible daughter dares to call his attention to them. The higher executives are guilty only of oversights, and others make, at the most, clerical errors. Foremen hide their mistakes, when possible, under a camouflage of detail, and the inspector's error was due to pressure of work. Joe the machinist, however, makes a mistake pure and simple and that of course is quite inexcusable! Joe, as a machinist, has only two ways of falling short, either by working too slowly or by doing something wrong. The engineering and research sections are continually making expensive experiments. Every unsuccessful experiment is in reality a costly mistake, but seldom is anyone blamed for this, simply because it is expected. Joe, however, is not expected to make mistakes.

If the president makes too many mistakes the corporation will go bankrupt! If Joe makes too many he will be fired. In the meantime, however, and under the best of conditions, the president falls short of perfection and costs the corporation hundreds of times as much each year as Joe's solitary mistake in spoiling 100 gears. Why should Joe pay for his mistake if others do not for theirs? —H. James, *Birmingham, England.*

Under Cover

Detective work is an honorable calling when a man makes it his work. He may have to do many things that appear to be under-handed, but results can not be obtained in any other way.

I agree with Al that if dishonesty exists and detectives are necessary, then outside men should be hired for that purpose. To such men an assignment of this kind is only one more job, and when the guilty persons have been found, their work is finished.

The only type of inside man who would agree to do such work would be one of the "sucker" type. His chances of success would be small, and if found out he would stand a poor chance of remaining among the men he spied upon.

There should be small need for such work if proper stock records are kept and material issued only as required. When conditions reach a point where the use of detectives seems necessary, a survey of what contributes to such a condition should be made.

—L. F. Swenson, *Industrial Engineer, Perkins Machine & Gear Company.*

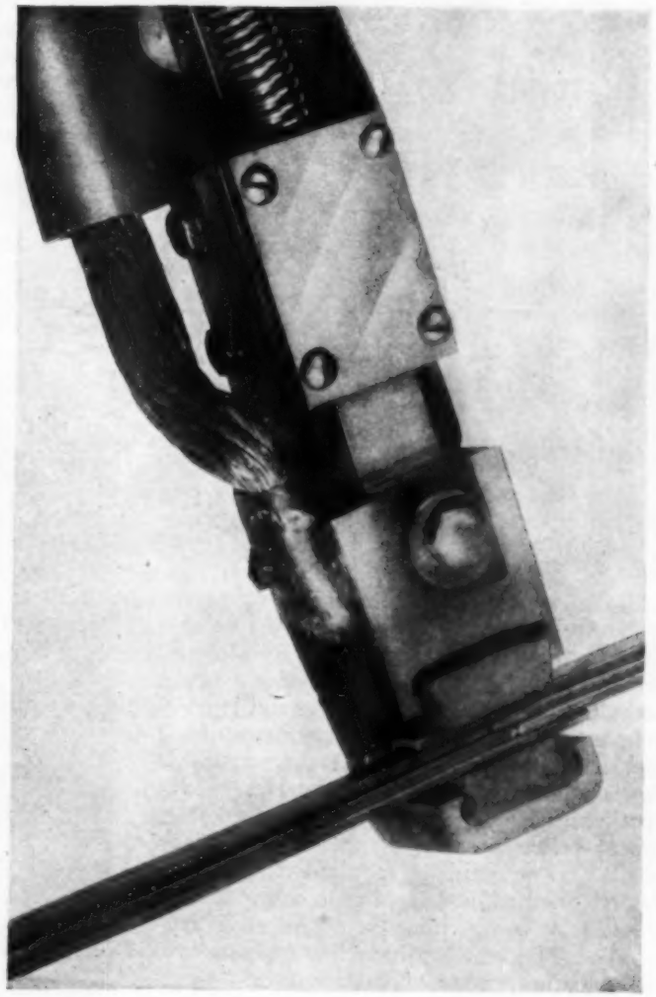
ELECTRIC RESISTANCE BRAZING

W. C. Reed
Pittsfield Works Laboratory,
General Electric Company

ANY discussion of brazing should properly be begun with a definition of the process and a comparison with soldering and welding. This can best be done on a basis of relative heat required. In soldering, done usually at 250-600 deg. C. (480-1112 deg. F.), without preheating the metals to be joined, the joining material, which may be any of the common lead-tin solders or a more complex material melting at a much higher temperature, simply flows between the pieces being joined, uniting them in much the same manner as glue unites two pieces of wood. This gives a joint of a strength dependent upon the tensile strength of the solder and upon the size and compactness of grain structure of the materials joined. Antimony has been added to solders occasionally to provide expansion and consequently to give a tighter joint upon cooling, but is now forbidden as a constituent because it embrittles the joint. In electrical work, soldering has long been standard, even though conductivity of the resulting joint is low.

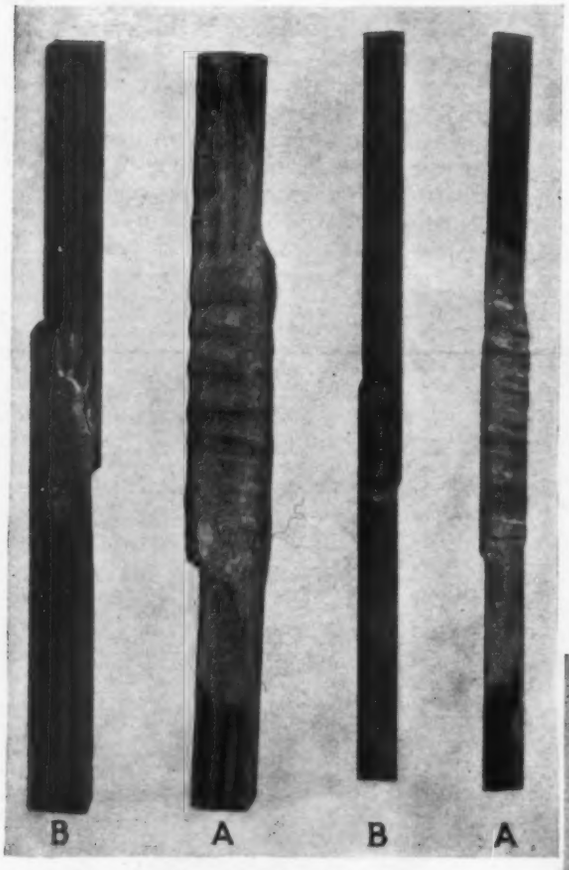
Next in order is brazing, a hybrid between soldering and welding. Brazing utilizes a higher degree of heat than soldering (700-1,100 deg. C. or 1,290-2,100 deg. F.). and yet gives a joint of different composition. In this process, metals to be joined are heated to a prescribed heat, brazing alloy being added either before heating or after, depending upon the process. This alloy flows into the joint and solidifies as in soldering, but also actually dissolves a thin film of the metals to be joined and creates an alloy having a higher melting point than the original constituents. The joint is somewhat similar to that made in welding. By this means, joint strength more nearly approaches that of the materials joined, even though they are not raised to their melting point. Brazing, sometimes called hard soldering, is one of the oldest of the mechanical arts. It is used on most metals where greater strength is required than can be given by soft solder, where high conductivity is required, or where the work must stand a degree of heat that would cause soft solder to melt.

Welding utilizes much higher heats, 1,000 to 3,600 deg. C. (1,832-6,500 deg. F.), and is an actual junction of the metals, joint composition being approximately that of the metals themselves. In many classes of work, the cost of welding, the high heats which must be attained in order to weld, or the unweldability of the material, prohibits the use of this process.



Horizontal type of brazing tong, showing a typical assembly as made in coil stacks. The method of mounting the carbon blocks is evident

Such metals as copper, nickel, silver, their alloys, and steel may be joined by brazing, pieces of like composition or pieces of widely varying composition being united with equal facility. Brazing has been primarily a hand operation because of the various factors involved, though in late years, electric brazing equipment has been developed. One method depends for its heat upon the electrical resistance of the metals being joined, thus requiring comparatively high pressures, more current because of the low resistance of the circuit, and resulting in a joint at lower temperatures. This process is usually known as "pressure brazing." Another process, utilizing the heat generated by passing current through a pair of carbon blocks having the joint clamped between them, and known as "resistance brazing," has been developed



Comparison of soldered and brazed joints. Coil stack joints "A" are soldered, "B" are brazed

by the General Electric Company, and is now being used by them in transformer manufacture, as well as being offered commercially. This method provides a dependable, quick, sure joint. The blocks heat readily at a lower current rating because of their high resistance. Less pressure is required than in the previous method, and heating is so rapid that the metals being joined are affected but slightly. The comparatively low temperature also prevents carbon breakdown or "grain growth." The joint is created by applying a thin strip of brazing alloy at the contact surface, the alloy flowing through the joint section and combining with a thin section of the joined metals to make a solid mass. Three different silver alloys are now being used as brazing media, depending upon the type of joint being made. One contains 50 per cent silver, and has a melting point of 725 deg. C. (1,337 deg. F.), another contains 30 per cent silver and melts at 735 deg. C. (1,355 deg. F.), and the third contains 10 per cent silver and melts at 830 deg. C. (1,526 deg. F.). In order to protect the insulation and prevent overheating small copper wire, the brazing must be kept at an absolute minimum of temperature, necessitating the use of the 50 per cent alloy. On larger cables, conductors, and terminals, the 30 per cent alloy is used because of its decreased cost. The alloy containing 10 per cent silver is best suited for brazing heavy bus bars, plates, and the like, where there is no insulation to be damaged by increased heat.

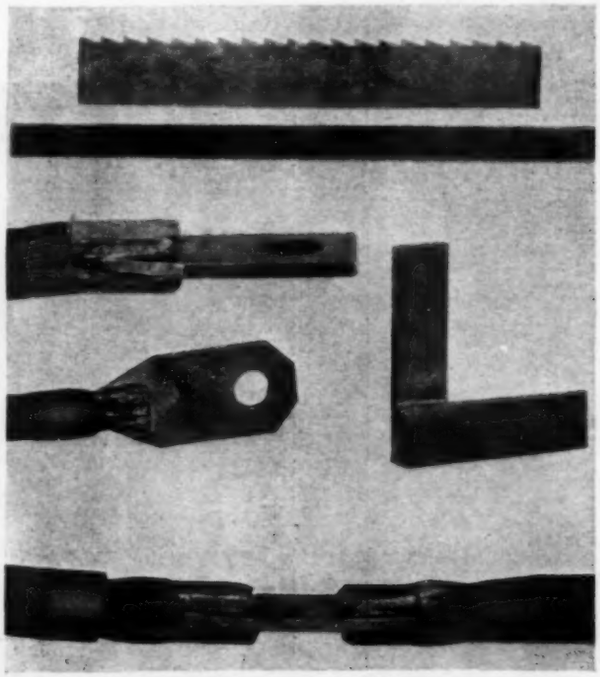
Fused borax, also called borax glass, is the flux generally used, but potassium acid fluoride in paste form is better in some jobs because it has less tendency to glaze the surfaces of the carbon blocks and thus insulate them against current flow. The borax can be used in dry powder form, in water solution, or mixed with vaseline. Dry borax is usually the more satisfactory because of the ease with which it can be applied from a shaker-top can or powder bellows, thus eliminating some of the waste incident to hand application. Flux is applied either before or after the current, but is less likely to cause glazing if it is applied after the pieces are clamped between the carbon blocks.

Brazing apparatus, as at present developed, consists of an air-cooled transformer, a foot switch, primary and secondary leads, and tongs for holding the carbon blocks. Either of two sizes of transformers may be used, depending upon the size of materials joined. A 5-kva. transformer wound with a 220-volt primary and an 8-volt secondary and weighing 45 lb. is used in brazing

Brazing with heavy tongs. Complete equipment is shown, including the outlets, cables, 10-kva. transformer and control switch

cables, conductors, bars, and similar parts up to 300,000 circular mils in cross-section. A 10-kva. transformer weighing 95 lb., wound for 220 volts on the primary and arranged with taps to give 8, 10, or 12 on the secondary, is required to make joints having cross-sections between 300,000 and 2,000,000 circular mils. These taps are of course changed depending upon joint size, the higher taps being used for larger sections. Both types will carry a momentary overload of 400 per cent. The entire equipment is readily portable, the 10-kva. transformer being carried most conveniently on a small hand truck.

Joints in material larger than 2,000,000 circular mils in cross-section are brazed in stationary machines or presses. Tong types and sizes are varied with the work being done.



Typical brazed joints, including: steel bandsaw butt joint on ⅛x½-in. copper conductor, copper clip brazed to flat terminal, stranded cable brazed to flat terminal, two ¾x1½-in. copper bars brazed at 90 deg., and two stranded cables brazed to flat plate

Surfaces of metals to be brazed should be flat at the joint, to insure good contact with the carbon blocks and to prevent arcing and hot spots. Round rods or wire are usually flattened, or the carbons are shaped to fit them. Tubular terminals are replaced by flat plates. When the plates are more than an inch wide, they are slotted to prevent excessive heat radiation, the slotted sections being brazed in turn. On particularly wide joints where slotting is impractical, a piece of the brazing alloy is laid in the joint before it is clamped. Experiments have proved that this is necessary where a penetration of more than ¾ to 1 in. is required.

Stranded cable is either wrapped with thin copper strip or inserted in a thin copper tube which is flattened before being clamped in the brazing tongs. The wrapping or tube should extend ½ to 1 in. beyond the braze. Cable insulation should be removed ½ to 1 in. beyond the braze, depending upon cable diameter, the bare cable then being wrapped with damp asbestos at the end of the insulation for protection. Copper braid is enclosed in a W-shaped copper clip 0.020 in. thick and slightly wider than the braid. When several flat strips of braid are used in parallel, one clip is put over the end of the group and should extend about ½ in. beyond the contact surface. A thin piece of brazing alloy is usually placed in the ends of alternate braids throughout the group before clamping in the tongs. In making a lap joint on cables, bars, or similar shapes, the length of lap should be 1½ times conductor thickness. Butt joints on rectangular conductors are made by holding the two ends together in a suitable clamp, applying the carbon blocks to the edges of the conductors, and feeding the alloy in from the flat side.

It is not essential to clean the surfaces for brazing to the same extent that is done in soft soldering, since the brazing flux removes the oxides and most other impurities. Certain oils and varnishes, however, are not removed by the flux and should be removed before brazing.

When parts to be joined have been prepared as described, they are clamped tightly between the carbon blocks. A small amount of flux is applied, and current turned on by means of the foot switch. Small sections are heated to brazing temperature in a few seconds, larger sections require much more time, and should be heated intermittently to give the heat a chance to be distributed throughout the mass. When the flux melts, a strip of the brazing alloy is applied at the line of contact of the metals. The alloy melts and follows the flux throughout the joint. Proper heating time is determined by the action of the flux, the heat being sufficient when the borax rises to the surface of the molten alloy. The joint must be cooled to a dull red, however, before the tongs are removed.

Joints made by this process are claimed to have several advantages over those made with ordinary soft solder. Usually a brazed joint can be made in one-half to one-third the time required for a lead-soldered joint under the same conditions. The small quantity of alloy used and the time saving makes the brazing method uniformly cheaper; mechanical strength, durability, and electrical conductivity are much higher. Brazed joints are uniformly much smaller and more accessible to inspection.

■

New Taps and Large Holes—*Discussion*

WILLIAM C. BETZ
Master Mechanic, Fafnir Bearing Company

YOUR reader (Vol. 73, page 636) is going to a lot of unnecessary expense if he is trying to fit taps to screws that are not uniform in size. The stoning of the outside diameter of taps to make the screws tight is all wrong. By making the outside diameter smaller, the screw fits only on this diameter leaving the thread pitch small and the screw loose endwise in the tapped hole.

To correct this condition, screws should be bought to decimal dimensions on the pitch diameter, and taps should be bought that will produce the required fit for the screws. Manufacturers of ground-thread taps are now listing them to plus and minus 0.004 in., in increments of 0.0005 in. or 0.001 up to ⅝ in. diameter, and to greater plus and minus dimensions on the larger sizes.

SPECIAL METHODS

In Airplane Engine Work

FRANK A. STANLEY
Consulting Mechanical Engineer

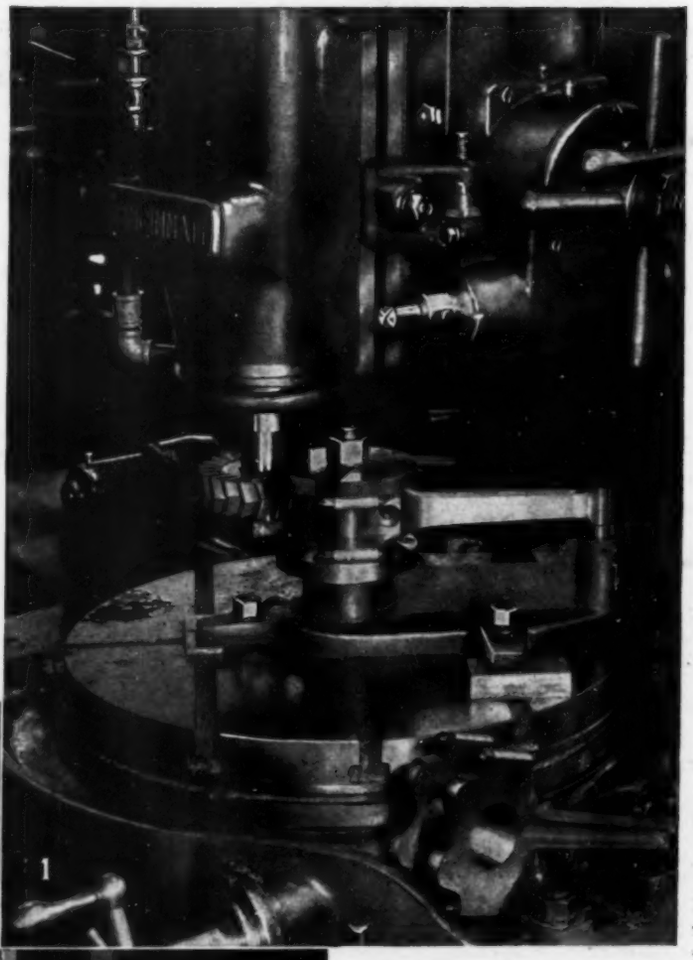


Fig. 1—Milling the master rod and cap using a pin-locating fixture. The 6-in. cutter is run at 19 r.p.m. with 2-in. per min. feed; the roughing and finishing cuts are ⅜ in. and 0.020 in. deep respectively

Fig. 2—Master rods are finish bored in this hand-operated device using a unique floating drive. The link-rod holes locate the part on ground plugs. 0.012 in. of metal is removed with a cutter fed by an 80-pitch screw

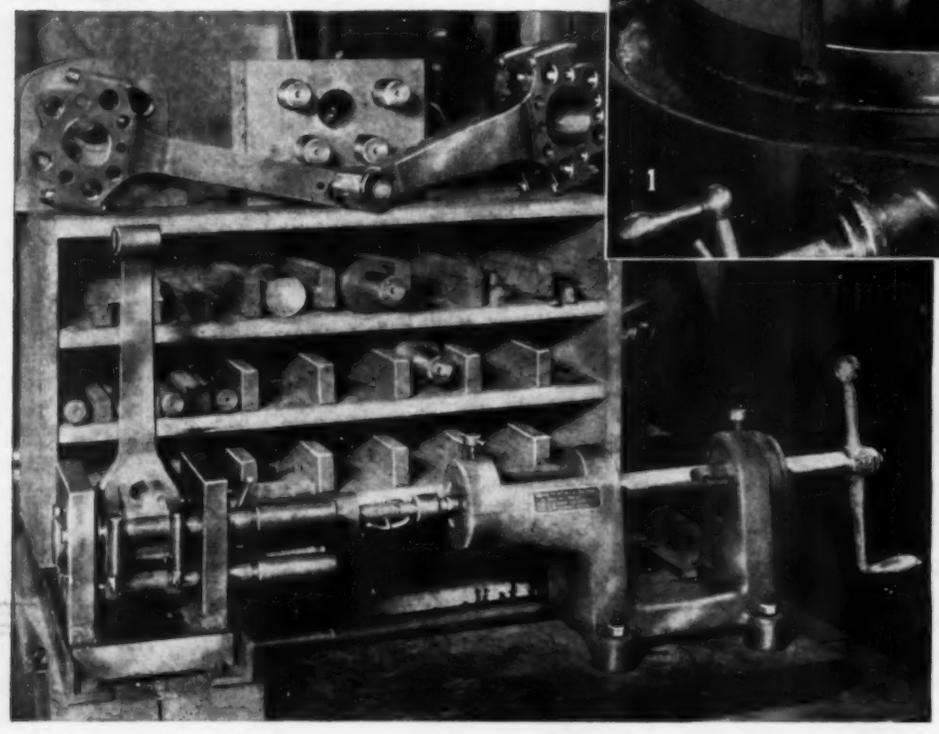


Fig. 3—Parallelism of the rod assembly is held within 0.005 in. on this V-block inspection fixture. Four plugs carried in a spider indicate variations from the standard when they do not all contact the surface plate. The rods are checked successively

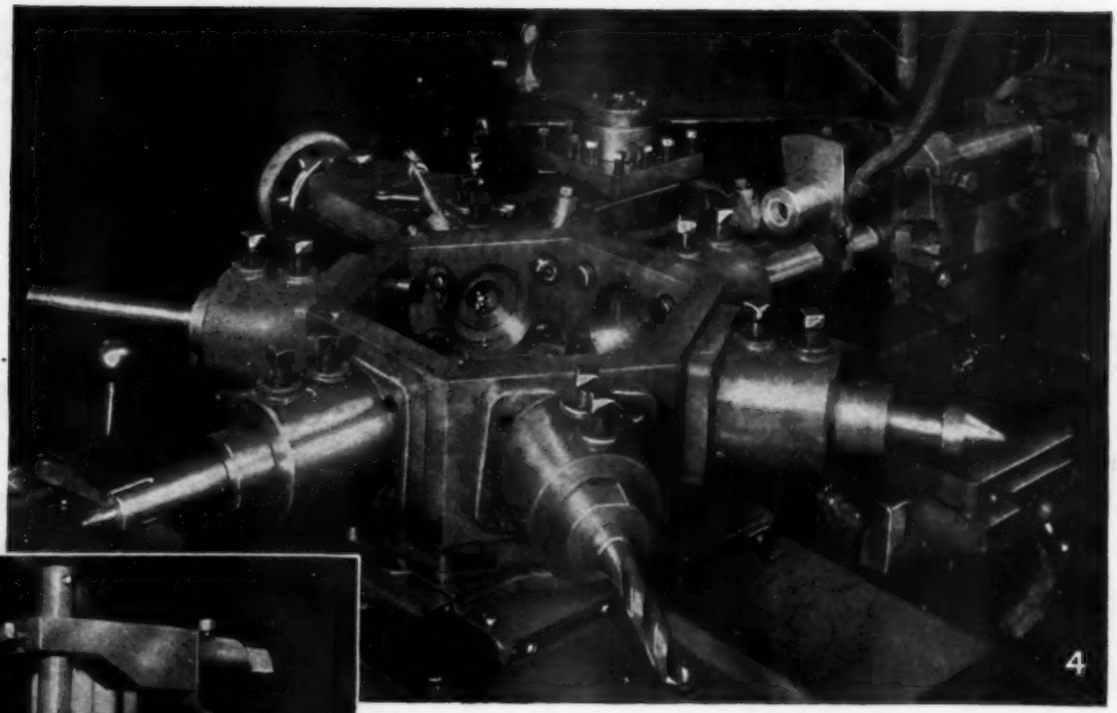


Fig. 4—Crankpins are drilled, bored, reamed, countersunk, and turned in this fixture. V-blocks offset the crankshaft to insure the correct pin throw

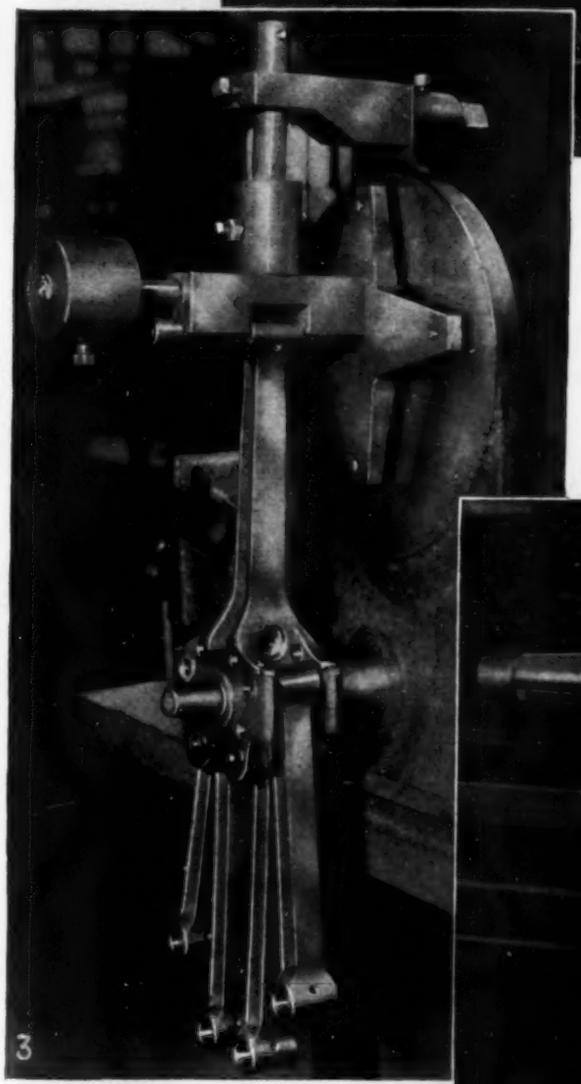


Fig. 5—The crankshaft is statically balanced within 0.01 lb. on 1⅛-in. round steel bars. The weight equivalent of the connecting rods is suspended from the pin by a steel tape. Shaft trueness is determined in V-blocks using a dial indicator

Photographs by Courtesy of the Kinner Airplane & Motor Corp.

THE SAFETY COURT AT WORK

ONE of my friends told me that a certain railroad, which has its main shops in my town, held safety court every Friday morning. Having in mind some of the discussions on the subject that have appeared in the Foremen's Round Table, I ambled over one Friday morning recently.

The testimony in the different cases was taken down in short-hand, and having a friend at court, I secured a verbatim abstract of several of the cases I listened to. Because of this testimony it should not be inferred that railroad shop labor is any less intelligent than labor employed elsewhere. The man who, for twenty years, tapped the wheels of passenger cars without knowing why he did it, has his prototype in the drill press hand who oiled the center in the top of the drill press spindle for an equal number of years, and he didn't work in a railroad shop either. The evidence given at the trial was the more illuminating because railroad men are not only drilled in personal safety, but safety for passengers and the general public is also stressed

CASE NO. 1. Time Lost: 121 Hours.

Q. State how you got hurt.

A. Well, we were putting up a large ash pan and I could not get the bolt in the hole to hold it in place. When I put my finger in the hole to find out which way the pan should go, one of the fellows let it down about an inch, cutting the top off my finger.

Q. Who would you say was to blame for this accident?

A. Well, I am only a helper and my mate never told me I should not put my finger in the hole. I think, he should have told me not to.

Q. How long have you been on that class of work?

A. About two years.

Q. Are you not the man who, a year ago, ran your auto into a switch engine that was standing on a crossing?

A. Yes, but no one got hurt and I did not see the engine, as it was raining.

CASE NO. 2. Time Lost: 5 Months.

Q. State how you got hurt.

A. Well, I am a painter and was told to spray twelve flue sheets that had just been completed and were left leaning against a six-inch square timber about four feet long on end, so that the spray would reach all the exposed parts on both sides. While, I was spraying the under side, someone, in passing, knocked out the timber, and they all fell on my hip breaking it. I should not have been told to do the job when sheets were in such a dangerous condition.

Q. Did you call attention to the dangerous condition?

A. No.

Q. What would have happened if you had called your foreman's attention to the condition?

A. He would have told me to get them placed safely.

Q. Would he have objected at all, to your suggestion?

A. No. He always has told us to take no chances.

Q. Then, who do you think is to blame for your accident?

A. "I dunno."

CASE NO. 3. Time Lost: 4 Days.

Q. State how you got hurt.

A. Well, I was helping to drill some 1¼-in. holes

overhead with an air motor and it started up before we got the drill in place. My glove got caught up on the drill point, twisting my hand so that I had to lay off.

Q. You say, it started up? What made it start? Was it a defective motor.

A. No. My helper must have moved the throttle.

Q. Would you have been hurt if you had not worn gloves?

A. No.

Q. Then, why did you wear them?

A. Well, the rest of the gang wear gloves.

Q. Why?

A. They protect the hands from splinters, I guess.

Q. Were you ever warned not to wear gloves around moving machines?

A. Not personally I wasn't, but there used to be a notice on the bulletin board about it. After a while no one paid any attention to it, and other notices got posted up about other things.

Q. Then what do you think is the real cause of the accident?

A. Well, if the motor hadn't started up it would not have happened.

Who was to blame, and what is the answer?

I wonder if we have reached the limit of safety education.

A Comfortable Place to Work

Discussion

W. R. NEEDHAM
English Electric Company, Stafford, England

THE excellent illustrations on page 327, Vol. 73, of *American Machinist*, showing some of the sanitary arrangements in the Huntington (W. Va.) shop of the Chesapeake & Ohio Railroad should make engineers pause. It took much tuition and an endless volume of oral and written words before practical psychology won its day for sanity in the regulation of working conditions. Light workshops, general cleanliness and orderliness, suitable temperatures, and attention to such apparently trivial matters as the facilitating of natural rythm of movement in manual tasks—all these things are now seen to be distinctly beneficial in aiding efficiency. They assist the worker and are much appreciated by thoughtful operatives, besides being directly instrumental in improving quality as well as volume of output.

Even yet, however, there are employers obtuse enough, retrogressive enough, not to understand the facts of the case. They would do well to study the illustrations and captions referred to. The conveniences shown are just as effective psychologically as carefully planned rest periods which break the monotony and tedium of arduous manual labor. These things *do* matter and matter profoundly. Attention of them by management and by the personnel concerned have a great and wholly helpful effect upon human efficiency and output. It is for management to observe, reflect upon, and apply the principles underlying the selection of such sanitary facilities if they would go forward instead of backward.

NEW BOOKS

TEXTBOOK OF THE MATERIALS OF ENGINEERING, FOURTH EDITION—*By Herbert F. Moore, research professor of engineering materials, Engineering Experiment Station, University of Illinois. 409 pages, 5¾x9 in. Clothboard covers. Indexed. 148 illustrations. Tables and questions. Published by the McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, N. Y. Price $4.00.*

The fourth edition is a thorough revision of this standard treatment of the physical properties of common materials used in structures and machines. All data are brought up to date, several chapters are rewritten, and a chapter added on the crystalline structure of metals. While a distinctly elementary text for classroom use in connection with courses in mechanics of materials or in the materials testing laboratory, the book may also be of use to draftsmen, inspectors, machinists, and executives who wish to become acquainted in an elementary way with the properties of materials. The author includes references at the end of each chapter for more advanced reading and appends a group of questions.

The extensive revisions required in this book in the few years since the last edition reflect the enormous progress of engineering and industry during the intervening years. Values for strength, ductility, and other physical properties of metals had to be entirely revised, and the chapter on specifications was entirely rewritten. These are but examples of the numberless changes in practice occasioned by industry's ceaseless progress in the direction of better materials.

THE CONSTITUTION OF STEEL AND CAST IRON—*By Frank T. Sisco, metallurgist. 332 pages, 6x9 in. Cloth board covers. Published by the American Society for Steel Treating, 7016 Euclid Ave., Cleveland, Ohio. Price $3.00.*

Shop men possessing only a modest background of technical education as well as those boasting an engineering degree will find a wealth of useful information in this book, especially if they feel the need of an up-to-date knowledge of the structure of ferrous metals and of what happens when such metals are heated and cooled to give them various properties.

Although written in terms used by the metallurgist, the author has made an effort to simplify the treatment and make it intelligible to readers who make no pretense to a knowledge of metallurgy.

Originally the book was prepared in the form of 24 educational articles appearing in the Transactions of the American Society for Steel Treating, but planned as parts of the present volume, hence not lacking in continuity.

Part I deals with the constitution of normal iron-carbon alloys, and Part II explains the theory of heat-treating and hardness, both parts being bound in a single volume. The book will make an acceptable addition to any library intended for metal-working-shop executives and engineers.

AMERICAN MACHINIST 1930 INVENTORY

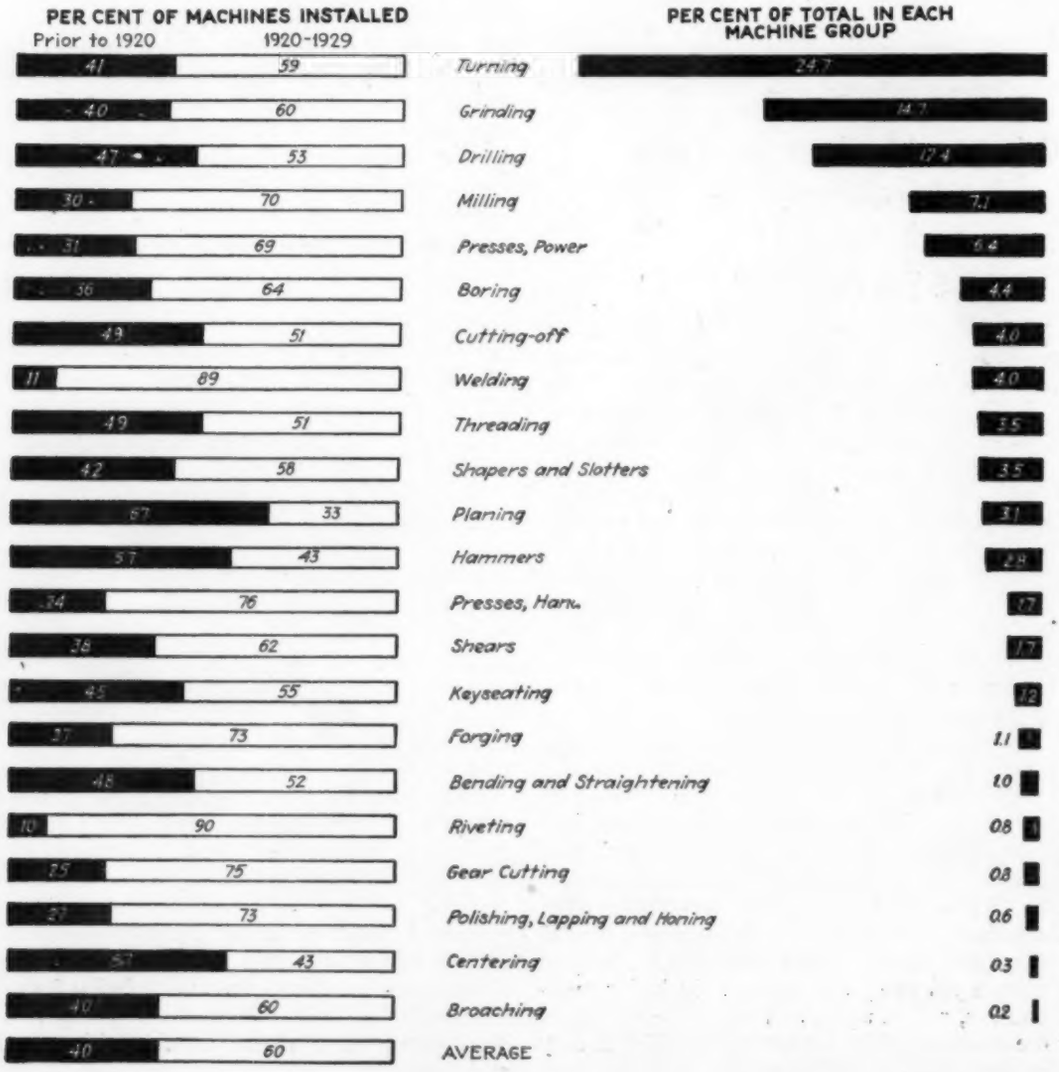
of Metal-Working Equipment

Report No. 14—Machines used by makers of mining, hydraulic, and oil-well machinery

THE 1925 inventory did not show this group separately but included it under "makers of other machinery and parts." In accordance with the plan of making the present compilation more comprehensive, the data for mining, hydraulic, and oil-well machinery have been segregated. Mining machinery is considered to include ore-crushers.

The count taken five years ago showed 50 per cent of equipment over ten years old for the miscellaneous machine group and a 44 per cent average for all industries. The 40 per cent of old equipment indicated for the plants covered in this report is therefore an improvement over either of these figures. It is also better than the percentage contained in any previous report in this series with the exception of aircraft and motor vehicles.

The total of machines used in this industry is not large, it being even smaller than that for makers of construction machinery published last week.


PER CENT OF MACHINES INSTALLED
Prior to 1920
1920-1929
PER CENT OF TOTAL IN EACH MACHINE GROUP
Turning 41 59 24.7
Grinding 40 60 14.7
Drilling 47 53 12.4
Milling 30 70 7.1
Presses, Power 31 69 6.4
Boring 36 64 4.4
Cutting-off 49 51 4.0
Welding 11 89 4.0
Threading 49 51 3.5
Shapers and Slotters 42 58 3.5
Planing 67 33 3.1
Hammers 57 43 2.8
Presses, Ham. 24 76 1.7
Shears 38 62 1.7
Keyseating 45 55 1.2
Forging 27 73 1.1
Bending and Straightening 48 52 1.0
Riveting 10 90 0.8
Gear Cutting 25 75 0.8
Polishing, Lapping and Honing 27 73 0.6
Centering 57 43 0.3
Broaching 40 60 0.2
AVERAGE 40 60

Machines in Plants Making Hydraulic, Mining, and Oil Well Equipment

	Total Number in Plants 1930	Number Installed Before 1920
LATHES		
Engine	1,037	515
Hand Turret	106	32
Power Turret	497	149
Automatic and Semi-Automatic	4	
Chucking (Not Chucking Machines)	50	11
Speed and Bench	89	46
Crankshaft	14	14
Toolroom Type	78	18
Other		
CHUCKING MACHINES (Not Chucking Lathes)		
SCREW MACHINES		
Hand	99	28
Automatic, Single Spindle	96	32
Automatic, Multiple Spindle	43	14
CENTERING MACHINES	25	14
MILLING MACHINES		
Hand (No Power Feed)	32	
Bench		
Plain (Knee and Column Type)	227	32
Universal (Knee and Column Type)	135	43
Vertical (Knee and Column Type)	131	85
Lincoln Type Manufacturing	14	
Continuous, Rotary Table or Drum Type	7	
Planer Type	18	7
Other	46	18
GEAR CUTTING MACHINES		
Rotary or Milling Type	14	11
Hobbing	35	4
Planing or Shaping	14	4
Other	7	
BORING MACHINES		
Horizontal Boring, Drilling and Milling	114	46
Vertical Boring Mills	234	85
Other	11	4
JIG BORERS	21	
DRILLING MACHINES		
Radial	348	138
Upright, One Spindle	504	280
Upright, Two or More Spindles	43	7
Upright Gang (Two or More Heads)	7	4
Sensitive, One Spindle	124	53
Sensitive, Two or More Spindles	7	7
Sensitive Gang (Two or More Heads)	4	4
Two, Three and Four Way	4	4
Other	18	
THREADING MACHINES		
Single Spindle Tapping	64	39
Multiple Spindle Tapping	4	4
Pipe Threading and Cutting	99	50
Bolt Threading and Cutting	96	46
Thread Chasing	4	4
Thread Hobbing and Milling	32	7
Thread Rolling		
Other	4	
PLANERS		
Open Side	35	21
Double-Housing	231	156
SHAPERS		
Vertical	43	
Horizontal	238	85
Slotters	21	18
KEYSEATING MACHINES	103	46
BROACHING MACHINES	18	7
GRINDING MACHINES		
Plain Cylindrical	128	32
Universal Cylindrical	96	32
Surface, Reciprocating	57	14
Surface, Rotating	25	7
Internal	78	18
Crankshaft		
Cutter	163	57
Floor, No Feed Attachments	312	138
Bench, No Feed Attachments	57	11
Abrasive Disk	53	28
Abrasive Belt	4	
Centerless	18	11
Other	266	168
POLISHING AND BUFFING MACHINES		
(Including those in Plating and other Depts.)		
Abrasive Wheel, Hand Operated	14	
Abrasive Belt, Hand Operated	11	
Automatic and Semi-Automatic	21	11
LAPPING MACHINES	7	4
HONING MACHINES		
CUTTING-OFF MACHINES		
Parting Tool Type	4	
Power Hack Saw	177	57
Rotary Cold Saw	60	60
Bandsaw	82	46
Other	21	7
WIRE FORMING MACHINERY		
Spring Coiling		
Other		
WELDING AND CUTTING MACHINES		
(See also Welding and Cutting Outfits)		
Resistance Welding, Butt	32	11
Resistance Welding, Spot	4	
Resistance Welding, Seam		
Resistance Welding, Other		
Arc Welding	160	4
Electric Cutting		
Gas Welding	64	11
Gas Cutting	71	11
RIVETING MACHINES, STATIONARY		
Pneumatic	50	7
Hydraulic		
Power		
PRESSES		
Punching Machines	241	64
Combined Punches and Shears	103	46
Hand, Arbor	121	32
Hand, Light Punch Press Work	7	4
Foot, Light Punch Press Work	18	
Power, Crank Type	82	14
Power, Toggle Type		
Power, Double Acting		
Power, Dieing Type		
Power, Trimming Presses	28	18
Power, Forcing, Arbor, Wheel	32	4
Hydraulic, Bending, Forming, Drawing	14	
Hydraulic, Wheel Forcing, etc.	35	18
Baling, Power and Hydraulic	4	4
Other	4	
BENDING AND STRAIGHTENING MACHINES		
Bending Brakes	14	7
Bending Rolls, Horizontal	60	28
Bending Rolls, Vertical	11	4
Straightening Rolls	4	4
Other		
SHEARS		
Knife	89	46
Rotary, Slitting	43	7
NIBBLING MACHINES	11	
HAMMERS		
Drop	35	32
Helve	11	11
Spring	22	7
Steam	135	71
Pneumatic (not portable)	14	4
Other	25	14
FORGING MACHINES		
Bulldozers	46	21
Hot Forging Machines	39	4
Cold Headers, Bolt, Nut, etc.		
Cold, Swaging		
Forging and Flanging Presses, Hydraulic	7	
Other Forging Machines		
Total	8,559	3,393

IDEAS FROM PRACTICAL MEN

An Automatic Facing Tool for the Turret

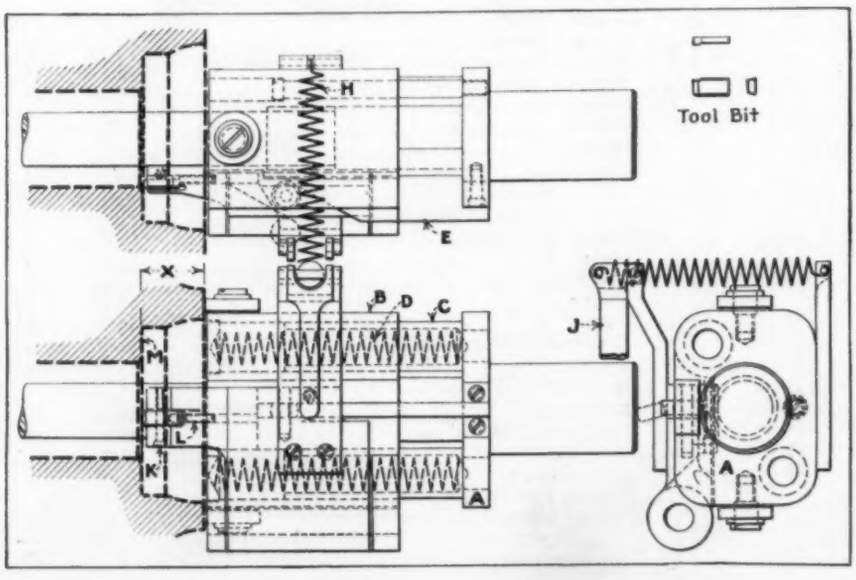
O. M. WOELFLE

IN MACHINING a differential case on a Potter & Johnston automatic turret lathe, the dimension *X* was required to be within a limit of 0.001 in. A flat facing tool could not be used to advantage because of the resetting difficulties involved in working to such a high degree of accuracy. The special tool shown in the illustration was designed to replace a forming operation, by a tool moving across the face of the work. By the use of this tool, the toolbit can be readily set, and requires no adjustment, thereby saving machining time and insuring the accuracy desired.

The tool consists essentially of a combined shank and pilot bar, to which is attached the rectangular flange *A;* the sliding head *B*, recessed in front to clear the swing toolholder, and guided by the two hollow pins *C*, which are secured to the flange; compression springs *D* to hold the rollers on the sliding head against the previously-finished end of the work; the cam plate *E*, against which the swing toolholder is held by the tension spring *H* with sufficient tension to prevent chatter; and the lever *J* for releasing the spring tension to permit the swing toolholder to be tipped forward to make the adjusting screw accessible. Tool regrinding and adjustment are made convenient by this device.

On the lower side of the sliding head are two lugs that form the fulcrum for the swing toolholder, which carries a roller engaging the cam plate. The toolbit is a snug fit in its holder, and is clamped and adjusted by the screws *K* and *L*, respectively. The cam roller has a spherical edge to accommodate the changing position of the swing toolholder. Tools in the cross-slide toolblocks are used for roughing and finishing the outer end of the work. Various turret tools are used for roughing the inside surfaces, leaving the finish cut on the surface *M* to be made with the tool just described.

In operation, when the tool is moved forward by the turret, the rollers on the sliding head contact with the end of the work, the head being held firmly in cutting position by the springs in the hollow guide pins. As the combined shank and pilot bar continue to advance with the turret, the camplate pushes the roller on the swing toolholder outward until the toolbit has moved across the surface *M*, completing the finishing cut. The feed of the toolbit is about one-half of the sliding movement of the turret.



A New Use for Celluloid

J. F. CAVANAGH
Mechanical Engineer

For many years I have used celluloid in the making of samples of parts to be molded from composition, and it seems to meet the requirements so completely that some information concerning its manipulation may be of interest.

Hard rubber and maple are ordinarily used in making samples of such parts as switch bases, caps, and knobs; usually no difficulty is experienced in producing parts that will serve for tryouts or checks on the design. But where deep recesses are involved, or where it becomes necessary to imbed inserts, the going is not easy in either wood or rubber, and here is where the virtues of celluloid are most appreciated. It is easily worked with the regular metal-working tools, the only operation barred being grinding, for obvious reasons. For long saw cuts, or large drilled holes it is advisable to cool with water.

Celluloid may be readily purchased in sheets up to 1 in. thick, but one or two thicknesses only are necessary, $\frac{1}{4}$ and $\frac{1}{2}$ in. being usually sufficient. Color is unimportant, although transparent material offers the advantage of readily showing the positions of inserts and the relation of holes in a manner not possible with opaque material.

In preparing for the work, the operator should provide an ounce bottle of amyl acetate and a pint of acetic acid in a fruit jar. Also he should have two or three sizes of pencil brushes, and a good bristle brush about $\frac{3}{4}$ in. wide. To make a thick piece, or a block, of celluloid, simply cement layers of sheet stock together by using the large brush to coat the contacting surfaces with amyl

acetate. In this particular operation, speed is essential as the liquid is very volatile. However, a little practice will master the trick. Before starting to machine the sample, try the following operation, and then some of the qualities of this material will be appreciated: Lay a piece of celluloid on the bench and press another piece against one of its edges, at a right angle. Then with a pencil brush flow some amyl acetate freely along the joint. It will flow quickly between the two pieces. Even while you are watching, the two pieces will have stuck together. In a few minutes the joint will be firm.

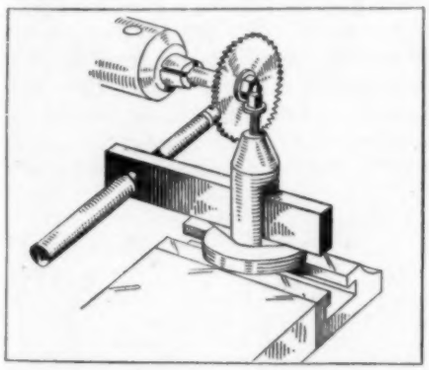
For rectangular recesses, build the part up from pieces as you would a box, using the above method to stick them together. Where inserts are employed, press them into their holes and flow a little amyl acetate around them. After the part has been finished and has been smoothed with fine sand paper, remove all dullness by immersing it in the jar of acetic acid, quickly withdrawing it. It should be supported by a pin or hung up by a wire until dry. If desired, a final jet-like finish may be given the part by dipping it into black celluloid dye, which can be purchased from the manufacturers of celluloid. Precautions must be taken against the fire hazard, but it is a significant fact that celluloid samples have been actually tried out on automobile-distributor parts without any disastrous consequences.

■

Fixture for Slotting Special Screws

H. L. Wheeler
Tool Designer, Engineering Division,
U. S. Hoffman Machinery Corporation

Where special screws are made in small lots, they can be easily and quickly slotted in a lathe by the fixture illustrated. A short piece of cold-rolled steel is drilled and reamed near one end for the screw holder, and is held in the toolpost of the lathe, parallel with the spindle. The screw holder is a bar turned for a sliding fit in the hole in the cold-rolled piece, leaving a shoulder to act as a stop. The small end of the holder is drilled and tapped to receive the screws to be slotted. With a saw held on an arbor in the lathe spindle, the screws are slotted by inserting them in the holder and pushing the holder through the hole in the cold-rolled piece, bringing the screw heads against the saw. For very small screws, the only feed required is by pushing in the holder by hand, the shoulder acting as a stop for the depth of the slots. The depth of cut is initially regulated by the position of the toolblock on the cross-slide, which need not be disturbed after the initial setting.

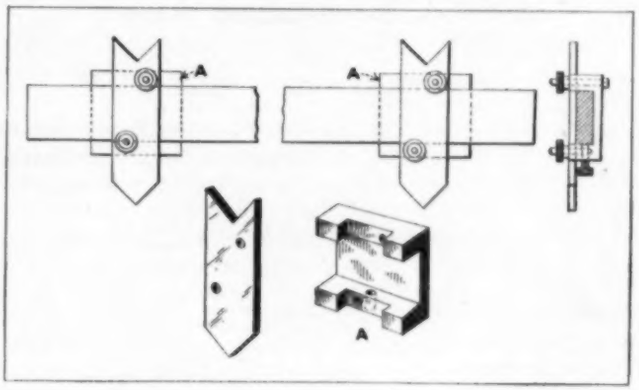


For slotting larger screws, the holder is held in the cold-rolled piece by a setscrew, and the regular cross-feed is used to feed the screws against the saw. The cross-feed stop is used to regulate the depth of the slots.

An Adjustable Planing Gage for V's

B. Thompson
Birmingham, England

Having a quantity of machine tables and bases requiring V's to be planed in them, we made the adjustable planing gage shown in the illustration. The straight-edge, or beam, is made of 2x$\frac{5}{8}$-in. mild steel, carburized, hardened and ground. Fitted to slide on the straight-



edge are two holders *A*, which can be locked in position by binding screws at the bottoms. Screwed and doweled to the holders are the gages proper, each of which has a V and an inverted V at the top and the bottom.

Having the holders and the gages ground to standard and known dimensions, it is an easy matter to set the centers of the V's to any required distance by laying gage blocks on the straight-edge and bringing the holders against them. In using the gage, a dial indicator may be substituted for the tool to determine when the planer head has been swiveled the proper amount.

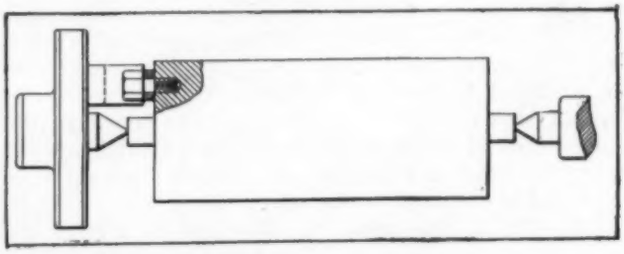
■

Driving Work by Three Dogs
Discussion

J. T. Towlson
London, England

Referring to the article by Harry Moore, under the title given above, on page 1,000, Vol. 72, of the *American Machinist,* I cannot but be in agreement with the author as to the ingenuity of his method of driving the work. But I hope he will bear with me when I suggest that, even by using three dogs, the whole of the torsion caused by the pressure of the cut will come upon the relatively-small mandrel.

We do much similar work down this way, and the method generally adopted is to put a capscrew in one end of the work near the periphery for a driver, and to put a small angle plate on the faceplate to do the driving, as



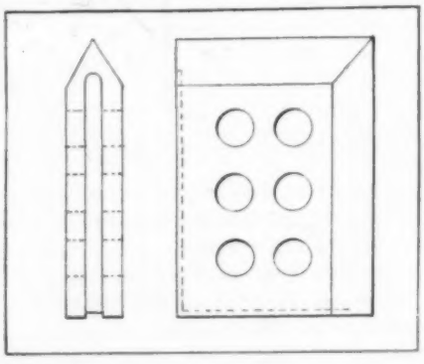
shown in the illustration. To stiffen the capscrew, a thick washer is put under the head, which is brought down tight upon it. Should the tapped hole in the work be a detriment, the exposed part of the screw can be cut off with a hacksaw and filed smooth, leaving the hole plugged up.

■

A Solid, Bevel-Edged Square

P. REDGRAVE
St. Catherines, Ontario, Canada

The square shown in the accompanying illustration is a very convenient one for inspectors and toolmakers, and is especially useful as a master square for checking the accuracy of squares of the ordinary type. It is made of machine steel, and after roughing out it is carburized, hardened, and finished all over by grinding. One of its good points is that its accuracy is not affected by dropping it, as is the case with the ordinary try-square.



In grinding the beveled edges, which should have an included angle of 60 deg., they are brought to sharp points, after which 0.005 in. is taken off of the points, so that they will not be too sharp.

■

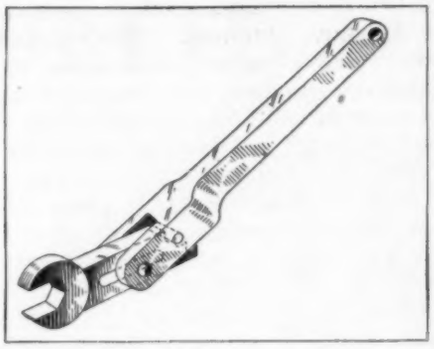
Another Open-End Wrench

CHARLES H. WILLEY
Superintendent of Manufacturing, Hoyt Electrical Works

I was interested in the open-end wrench described by L. Coon on page 1034, Vol. 72, of the *American Machinist*. Here is another and different type of open-end wrench to add to the readers' collection. It was made by me on board ship in the navy, while serving as a machinist's mate. We used to have a lot of time off watch at sea, and some of the hours were spent in inventing, so that we could get rich and not have to stay in the navy until we were retired and pensioned.

The idea for this wrench was born of disgust with all the various types of wrenches given us to work with. It seems that there never was one having just the right angle of "getattiveness" in its makeup. If any of the readers of the *American Machinist* have ever had to take apart or overhaul anything in the bowels of a ship, they well know that the designers never allowed room for wrenches to turn more than a few degrees of the necessary arc at a time. It was a case of carrying a lot of wrenches of different shapes to the job, and keeping on laying down and picking up different ones until we succeeded in getting the nut off or on.

The wrench illustrated was invented to master the



situation, and to me it was well worth the effort for use in one particularly stubborn place in my station of repairs. As will be seen from the illustration, the shank can be adjusted to three different angles in relation to the jaws. I kept a set of such wrenches until I was paid off. I forgot to go to Washington and get the wrench patented, for, as is well known, sailors forget to attend to business when they get ashore. They just go around having a good time making up for all they lost while at sea.

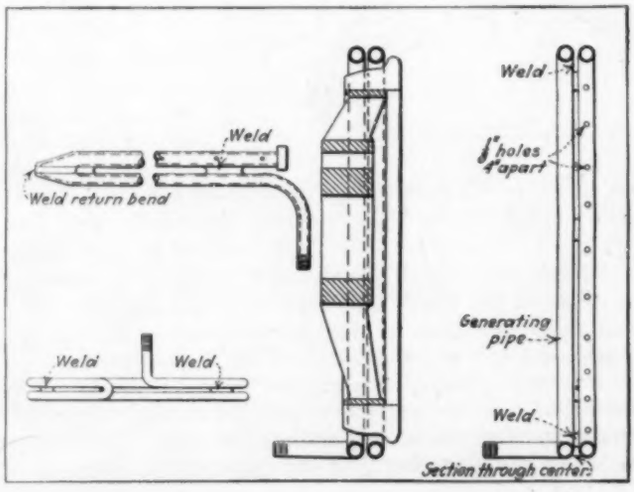
■

Heater for Driving-Wheel Tires

H. H. HENSON
Cincinnati, New Orleans and Texas Pacific Railway
Chattanooga Shops

A simple and inexpensive device for heating driving-wheel tires for mounting or removal is shown in the illustration. Kerosene is used for fuel, and no preheating stove is necessary for generating the gas. Oil is siphoned to the burner from a portable tank and is forced through a Thermoline valve by compressed air, causing vaporization. The vapor passes to the generating pipe through a rubber hose, and from there to the burner pipe, and is delivered through the $\frac{1}{8}$-in. burner holes. After the vapor has been ignited, the generating pipe becomes heated, causing the vapor to be more inflammable and to burn with a very hot flame. Other fuels such as gas might also be used.

The pipes are welded together at their ends to avoid the necessity for using a return bend, and at other points to stiffen them. A complete circle is not formed by the heater, a gap being left so that it can be slipped over the main and connecting rods. Thus, it can be placed in position and the heating started for the removal of a tire before the rods are taken off. The inside diameter of



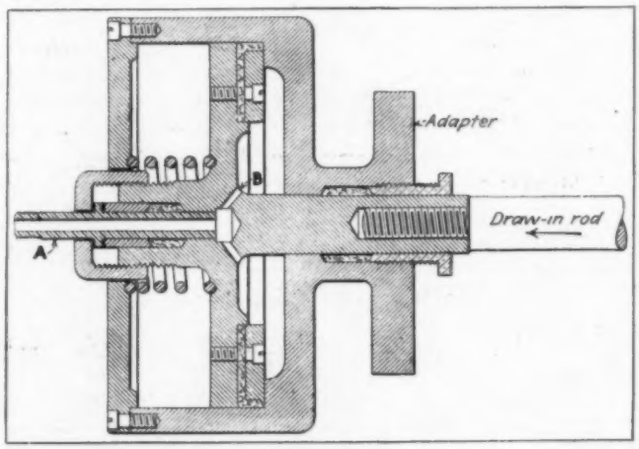
the heater is from 1 to 2 in. larger than the outer diameter of the tire to which it is to be applied. The pipes are both ½ in. inside diameter, this size having been found to give the best results.

■

Home-Made Single-Acting Air Cylinder

JOHN G. JERGENS
Engineering Department, The Warner & Swasey Company

A single-acting air cylinder that can be adapted either to a cylindrical grinding machine or to a production lathe equipped with draw-back collets is shown in the illustration. The cylinder is attached to the rear end of the machine by an adapter, the piston and the draw-in



rod being normally held in the position to release the collet from the work.

In operation, a three-way valve is connected between the air line and the swivel *A*. When air is admitted, it passes through the swivel and out through the hole *B* into the forward end of the cylinder. The pressure pushes back the piston, carrying with it the draw-in rod connected to the collet. Thus the collet is drawn back and is closed on the work. When the valve lever is turned so that the air is exhausted from the cylinder, the spring pushes the piston forward, and with it the draw-in rod, releasing the work.

The swivel is made of tool steel, hardened and ground. The piston and the stuffing boxes are of bronze. All other parts, except the draw-in rod, are of cast iron.

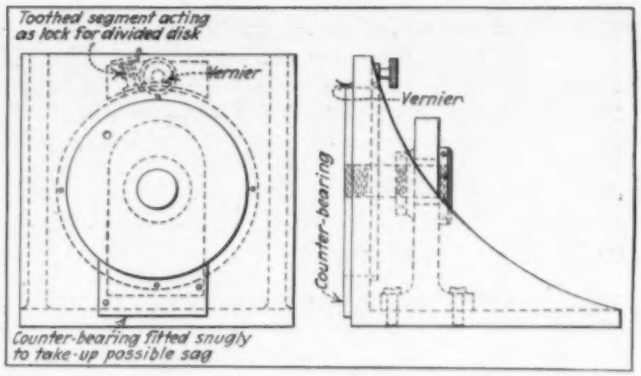
■

A Universal Angle Plate

GEORGE BELBES
Production Engineer,
Gaertner Scientific Corporation

In the illustration is shown an angle plate for laying out work that will prove to be of value in machine shops, toolrooms, and inspection departments. In a great many cases it will displace the sine bar and the consequent calculations necessary in its use.

The vertical member of the angle plate is bored to



receive a graduated disk. To the horizontal member is attached a standard having a bearing for the shaft of the graduated disk. The graduated disk is thicker than the vertical member of the angle plate, and when it is assembled in place it protrudes equally from each side. On the protrusion at the rear is forced and pinned a steel ring, in the periphery of which 360 teeth are cut, one tooth for each degree. Meshing with the teeth in the ring is a driving pinion, providing means for rotating the ring and the graduated disk.

On the periphery of the portion of the graduated disk protruding from the front of the angle plate are 360 divisions. A vernier scale at the top affords a possible reading of four minutes of arc. Holes are drilled and tapped in the front of the graduated disk and special clamps are provided for clamping work to its surface. The graduated disk is mounted on a shaft that is supported in the bearing before referred to, the shaft being collared on each side of the bearing to prevent end play.

Having set up and squared the work by well-known methods, both it and the graduated disk can be rotated to any required angle, as indicated by the vernier. A toothed segment near the driving pinion can be used to hold the graduated disk in position at any even degree.

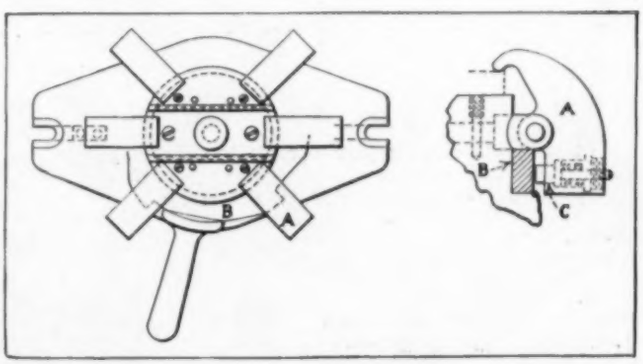
■

A Ring-Parting Fixture

W. H. MALLIET
Supervisor, Design & Development,
Royal Typewriter Company

In the illustration is shown a fixture for holding cast-iron rings, 7 in. in diameter and about ¾-in. wide, while they are being cut into segments.

The six swivel clamps *A* are operated by the cam ring *B*, its angular surfaces riding on the spring pins *C*



in the lower parts of the clamps. To compensate for variation in the height of the work, the pins are backed by heavy springs of square section. The cam ring rotates on a raised part of the fixture base, being confined by the pivot supports of the clamps, and is operated by the lever shown. As the ring is turned to release the clamps, their overhanging weight causes them to swing away from the work, permitting its removal and the insertion of another piece.

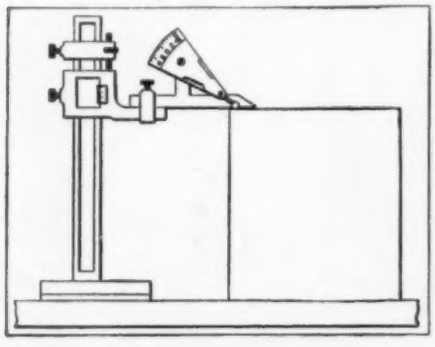
A previous fixture for this work was in use for a long time, but it was too slow in operation, the clamps being operated by hex-head screws. By the use of the new fixture, the loading time was reduced to one-tenth of that required by the old fixture.

■

Scribing Lines With a Height Gage

CHARLES KUGLER

When lines are to be scribed on the side of work at a definite distance from the top, the scriber of the height gage must be brought in contact with the top of the work in order to find the point of departure. Since to determine when the scriber is in proper contact with the top of the work depends upon the sense of touch, its position is not always accurately known, because the contact may be too heavy or too light. Even when prussian blue is used as a marker, different men are likely to get varying readings. The following method makes for greater accuracy and entirely eliminates the sense of touch: The scriber is made as shown and an indicator is attached to it. A scale is clamped to the under side of the scriber, touching the point of the indicator, and the indicator is adjusted to read zero. If the scale is removed and the scriber is placed over the work, as shown in the illustration, it can be moved downward until the indicator reads zero. The reading of the vernier will then give the accurate height of the work. Taking the vernier reading as the point of departure, the scriber can be accurately set to any distance below the top of the work, thus eliminating the sense of touch in the original setting, the results of which cause many disputes between toolmakers and inspectors.



■

Non-Metallic Spur Gear Horsepower Formulas—*Correction*

An error occurred in the printing of the final formula in the first column of the Reference Book Sheet, appearing under the above title, on page 679, Vol. 73. This formula should read: "150 over 200 PLUS PLV," etc., instead of "200 times PLV."

SEEN AND HEARD

●

Putting-on Tools

AS SOMEBODY said at a recent A.S.M.E. meeting, many a machinist who has cut off a little too much metal from pieces he has worked upon, has wished for a putting-on tool.

At least two such "tools" are available today. One of them is the electric arc, which is used extensively in fusing new metal onto worn parts, or in building up surfaces that have been cut away by mistakes in machining.

In the second method (for it is a process rather than a tool) metal is deposited by electroplating. Recently the Westinghouse research laboratory has perfected a process in which iron is electrodeposited from a solution of ferrous ammonium sulphate and ferrous carbonate using Armco iron anodes. Iron is deposited at the rate of about 0.006 in. per hour. Many undersize and worn parts now are salvaged economically through building up in this process. —*N*

"Whip" in Boring Bars

MODERN PRODUCTION demands better tools than ever before, with more thought in designing the tools and more care in using them. Take the boring of piston-pin holes in the modern automobile pistons. We always tried to get them square and round and of the right size, but we missed it in many cases. Now we finish bore with a diamond tool, or with tungsten carbide, instead of depending on a reamer.

And to secure the greatest accuracy possible we take the "whip" or unbalance of the boring bar into account. Even a small bar, we find, does not often revolve around its dimensional axis at high speeds.

The center of gravity is usually enough off center to make a slight whip, and we check this by boring a hole measuring the hole bored rather than depending on the measured diameter of the cutters in the bar. And before deciding that this is a fad and is unnecessary, it is well to remember that production costs are lower than ever in spite of the refinements.

Temperature and Rejections

RECENT experiments at the Ford plant indicate that many shops may be rejecting work and discarding perfectly good gages because of temperature variations in their inspection rooms or in other departments. A variation of 10 to 15 degrees is said to show a change of a "tenth" on some work. When you are working to two or three-tenths as a maximum tolerance, you can't afford to waste one of them because of a draft or because the sun shines through a glass skylight. We've known all along how temperature affects metals, but we haven't reckoned on rejections because a breeze came in the inspection room window. —*J. R. G.*

Pin Measurements for Gear Tooth Inspection

1 D.P.—Size of gear teeth over pins 1.750 in diameter

Even Teeth

Teeth	14½°	17½°	20°	22½°	25°	27½°	30°
8	10.389	10.389	10.394	10.403	10.416	10.432	10.451
10	12.415	12.411	12.413	12.420	12.431	12.445	12.462
12	14.436	14.429	14.428	14.433	14.442	14.455	14.471
14	16.454	16.442	16.440	16.443	16.450	16.462	16.478
16	18.468	18.454	18.450	18.451	18.457	18.468	18.483
18	20.482	20.464	20.458	20.457	20.463	20.473	20.487
20	22.493	22.473	22.465	22.463	22.468	22.478	22.491
22	24.502	24.479	24.470	24.468	24.472	24.481	24.494
24	26.512	26.487	26.475	26.472	26.475	26.484	26.497
26	28.520	28.492	28.481	28.476	28.479	28.487	28.499
28	30.526	30.497	30.484	30.479	30.482	30.489	30.501
30	32.532	32.500	32.487	32.482	32.484	32.491	32.502
32	34.536	34.505	34.491	34.484	34.486	34.492	34.504
34	36.542	36.509	36.494	36.487	36.488	36.493	36.506
36	38.547	38.512	38.496	38.489	38.489	38.495	38.506
38	40.553	40.516	40.499	40.490	40.491	40.496	40.507
40	42.557	42.519	42.502	42.492	42.492	42.498	42.508
42	44.561	44.523	44.503	44.495	44.493	44.499	44.509
52	54.576	54.533	54.510	54.500	54.498	54.502	54.513
72	74.597	74.546	74.521	74.507	74.504	74.510	74.518
102	104.616	104.557	104.528	104.513	104.511	104.513	104.521
142	144.625	144.562	144.535	144.514	144.514	144.514	144.523

Odd Teeth

Teeth	14½°	17½°	20°	22½°	25°	27½°	30°
9	11.256	11.254	11.258	11.265	11.277	11.291	11.309
11	13.307	13.301	13.302	13.308	13.318	13.331	13.348
13	15.346	15.336	15.335	15.338	15.347	15.359	15.375
15	17.376	17.362	17.359	17.361	17.368	17.379	17.395
17	19.400	19.384	19.378	19.379	19.384	19.395	19.409
19	21.420	21.402	21.394	21.393	21.398	21.408	21.422
21	23.437	23.415	23.406	23.405	23.409	23.418	23.432
23	25.452	25.428	25.417	25.415	25.419	25.427	25.440
25	27.464	27.438	27.427	27.423	27.427	27.434	27.447
27	29.476	29.448	29.435	29.431	29.433	29.441	29.453
29	31.485	31.456	31.442	31.437	31.439	31.446	31.458
31	33.495	33.463	33.449	33.443	33.444	33.451	33.462
33	35.503	35.469	35.454	35.448	35.448	35.455	35.466
35	37.511	37.476	37.460	37.453	37.453	37.459	37.470
37	39.516	39.480	39.463	39.455	39.455	39.461	39.472
39	41.523	41.485	41.467	41.459	41.458	41.465	41.475
41	43.529	43.489	43.472	43.463	43.463	43.467	43.478
43	45.534	45.493	45.475	45.465	45.465	45.470	45.481
53	55.554	55.508	55.486	55.477	55.474	55.479	55.490
73	75.580	75.530	75.505	75.490	75.487	75.492	75.500
103	105.600	105.544	105.513	105.499	105.496	105.500	105.507
143	145.619	145.555	145.526	145.506	145.506	145.507	145.518

SIZES given are standard; no backlash allowed; tooth and teeth space are taken as equal. For pitches finer than 1 D.P., divide the figure opposite the number of teeth, in the column corresponding to the pressure angle, by the pitch. To obtain the pin diameter, divide 1.750 in. by the pitch.

Example: 20 teeth, 10 pitch, 25-deg. pressure angle:

$$\frac{1.750}{10} = 0.175 = \text{size of pins}$$

$$\frac{22.468}{10} = 2.2468 = \text{size over pins}$$

The size for gears having numbers of teeth not shown, such as between 42 and 52, can be found readily by interpolation. When interpolating, care should be taken to use the upper half of the table if the teeth are even in number, and the lower half if the teeth are odd in number. Thus, the size of a 47-tooth gear would be found between 43 and 53, not between 42 and 52.

For numbers of teeth greater than 142 and 143, a close approximation can be found readily by adding two for every two teeth greater, to the figures for 142 if even, and 143 if odd. For pressure angles falling between those given in the table, a close approximation can be obtained by interpolation. The greatest difference is between 27½ and 30 deg. for an 8-tooth gear, and this is only 0.019 in. If the figure for 27½-deg. had been used on a 30-deg. pressure angle for a 10-pitch gear, the error would be 0.0019. Assuming a pressure angle of 29 deg. and adding ⅘ of 0.019 to the figure for 27½ deg., the result is 10.442. Actual calculation gives 10.443, an error of only 0.001 for a 1-D.P. gear or 0.0001 for a 10-D.P. gear. When it is considered that these errors are in diameter, and that the errors in tooth thickness are approximately half again as large, these figures will be seen to have sufficient accuracy.

Contributed by Sam Trimbath to accompany his discussion on "Constant Chord Gaging," on page 769 of this number.

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American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

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Vol. 73 No. 20

Gear Grinding Grows

AT ROAD SPEEDS of ninety miles an hour, gear noise is a factor to be considered. The better class automobiles, therefore, have been for some time the major market for ground gears. Of late, these accurate gears have been finding their way into machine tools and other mechanisms; and now a new field is opening that will require more and more of them.

Electric motor drives for locomotives, several hundred of which are said to be on order for the electrification of one of the large railroads, have occasioned the building of special machines for grinding the teeth of the large driving gears. So gear grinding grows in both old and new lines.

Probably more gears are being ground today than ever before, but little is said about them. The reason for this may be that most of these gears are ground in shops which specialize in this type of work, where experience makes possible a good job at low cost.

Advances in Machine Design and Construction

ROMANCE and adventure are not confined to any one profession. We often scent romance in lines of work with which we are not familiar and pass it by when it appears near at home. But what is more adventurous than to design a new machine that discards many precedents and strikes out along new lines? For even though one plans the new design most carefully, it is no small responsibility to spend thousands of dollars in a new machine that depends for its success on new features.

New types of bearings, new methods of supporting heavy moving parts, new control devices to increase efficiency and safety all require large initial outlay and take courage both on the part of the designer and of the one financially responsible for the success of the concern. The buyer, too, must have something of the spirit of adventure to invest more in a single machine than was formerly considered necessary for the equipment of a whole shop. True, the machine is guaranteed by its builder, but even if completely successful mechanically it will take many months of constant use to justify the expenditure. And if orders drop off the problem becomes more difficult.

As with most advances in manufacturing methods complete success comes only through the cooperation of builder and user. Any really new machine is more or less of an experiment that requires modifications and patience before success is finally achieved. Antagonism, coupled with demands for immediate perfection, delays progress and is unprofitable to all concerned. Unless cooperation is assured, the builder of a new machine makes slow progress and industry suffers from the delay.

Those who are old enough to contrast the earlier machines with the latest developments cannot fail to be thrilled with the advances made along many lines.

Standard Temperatures for Fine Measurements

OLD man temperature has always been on the job but we are just beginning to realize what an important old chap he is in the average shop. Of course he didn't cut so much of a figure in the days when a thousandth, or shall we say "mil," was precision measurement. But now when we not only talk about "tenths" but can actually measure them without calling in a college professor, temperature has to be reckoned with even in the average shop.

Ford, for example, is putting constant temperature inspection rooms in his production line. The close tolerances demanded in the modern automobile make the difference caused by a few degrees of temperature variation a real problem where close fits and interchangeability are concerned.

Another example of the effect of temperature is a large planer where the housings were out 0.00075 in. in 52 in. This error is corrected by a rise of temperature of only 6 deg. at the top of the housing. All of which goes to show the necessity for a standard temperature at which gages and the like are measured. Observance of the 68 deg. F. standard should become a habit in all good shops.

SHOP EQUIPMENT NEWS

Hayes "Certain Curtain" Furnaces for High-Speed Tools

Positive control of the neutral atmosphere is secured in the "Certain Curtain" furnaces built by C. I. Hayes, Inc., 129 Baker St., Providence, R. I. One of these furnaces was previously described on page 1018, Vol. 69, of *American Machinist*. Since that description, various improvements have been made and several sizes have been added to the line. Among the most important improvements are: A raised hearth which permits circulation of heat below the hearth as well as above; the addition of a manometer at the front, as a guide to the operator in determining the mixture used in securing proper furnace atmosphere; and the general construction has been improved to increase the thermal efficiency and decrease power consumption.

Maintenance of a neutral furnace atmosphere in "Certain Curtain" furnaces prevents blistering, pitting and scaling of high-speed steel tools and also prevents grain growth with subsequent brittleness. For example, with small intricate tools no evidence of scaling, pitting, carburization or decarburization is found after the process, and it is not necessary to grind the surfaces of these tools after heat-treating, nor is it necessary to use a low temperature for heat-treating in order to protect them. Delicate broaches, milling cutters, form tools, reamers, fine drills, taps, and threading dies of 18-per cent tungsten steel can be given the full 2,400 deg. F. hardening heat without danger or difficulty. Furthermore, even a soak for 10 min. in a neutral atmosphere does not result in excessive grain growth, whereas such a soak would be out of the question in an oxidizing atmosphere. With this furnace then, it is possible to take large numbers of small tools at a time, spread them in a nickel pan, allow them to soak in the furnace long enough to get up to a uniform temperature throughout the batch, and then quench the lot. Uniform high temperatures are obtained throughout the pieces in the batch, without spoiling the surfaces of pieces near the edges of the batch.

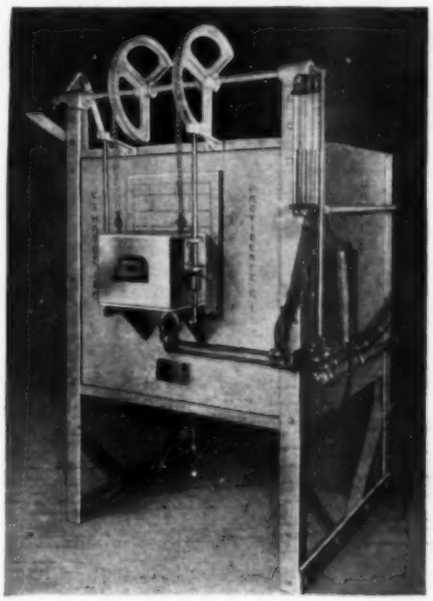


Fig. 1—Hayes Type HG-52 "Certain Curtain" Heavy-Duty Furnace equipped with a raised hearth and a volume indicator for the atmosphere control, as shown at the upper right

Fig. 1 shows a furnace fitted with a volume indicator or atmosphere control. It is possible to adjust the needle valves shown below the manometer, to obtain known proportions of air to gas admitted to the combustion chamber. Products of combustion from this controlled air-gas mixture form the furnace atmosphere in the heating chamber itself. Outside air is excluded from the interior of the furnace by means of the curtain of gases arising from the combustion chamber, as shown in Fig. 2. These gases rise through the slot 3 and prevent oxygen from entering the furnace through the front door. They completely fill the furnace with a neutral mixture and are heated by means of Globar elements capable of producing a heat of 2,500 deg. F. for continuous operation and up to 2,700 deg. F. for experimental or intermittent service. Uniform heat distribution and accurate control are thus assured.

Furnaces are designed for use on a.c. circuits, single phase, or d.c. circuits at 110 or 220 volts. A power input control board is furnished with the furnace to regulate the power supplied to the Globar elements, since these elements gradually increase in resistance with use, and therefore the voltage must be raised. Light-duty furnaces are available in models HG-22, 32 and 42, the first two being bench types. Heavy models are the HG-52, 64, 65, 70, and 72. All of the heavy-duty models are of the improved design. Heating chambers for these models range from 4 in. high by 8 in. wide by 12 in. long to 12 in. high by 16 in. wide by 30 in. long. Capacities range from 24 to 69 kw.

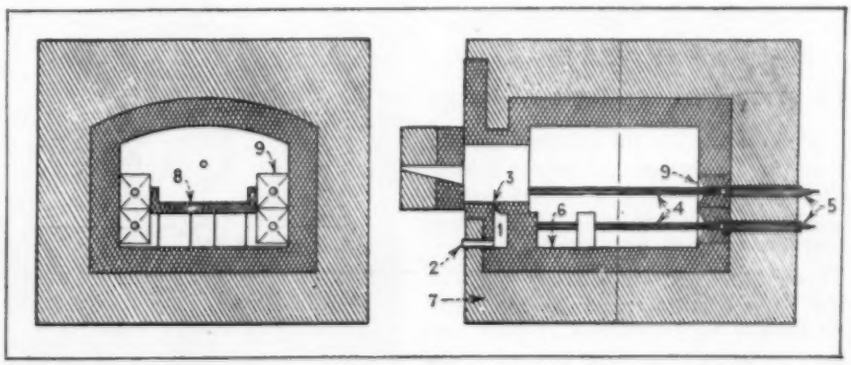
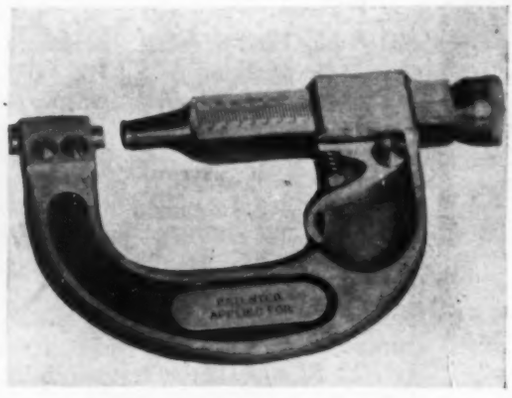


Fig. 2—Cross- and lengthwise sections of the Hayes "Certain Curtain" Furnace. The numbers referred to are: (1) atmospheric combustion chamber; (2) inlet; (3) slot emitting curtain of gases; (4) Globar heating elements; (5) water-cooled terminals; (6) refractory linings; (7) heat insulation; (8) hearth plate, and (9) terminal bricks

Mischker Square-Barrel Micrometer

Quick setting by means of a ratchet to within 0.025 in., and then final measuring by means of a graduated barrel are features of the square-barrel micrometer developed by John Mischker, 8 Wright St., Milwaukee, Wis. The measuring stem with its square barrel is removable, and is intended for use with a set of frames of varying sizes. Thus, one stem and a set of frames replaces a set of complete micrometers.

The stem is provided with a short thread sufficient for one complete turn or 0.025 in. movement. An inside stem is provided with the set, so



that by removing and reversing the barrel and the employment of the inside stem, the micrometer can be changed to make inside measurements. The instrument is supplied in an attractive carrying case.

Smillie Cut-Off, Flaring, and Reseating Tools for Copper Tubing and Fittings

Three tools for cut-off, flaring, and reseating operations on copper tubing and fittings have been placed on the market by C. M. Smillie & Company, 520 E. Larned St., Detroit, Mich. These tools are particularly used in the refrigeration, machine tool, and oil burner fields. The C-1 tube cutter, illustrated in Fig. 1, leaves the tubing round and without any burr on the outside. The burr cutter on the end of the tool is for removing inside burrs before flaring the tube.

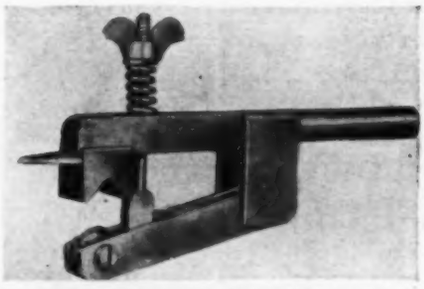


Fig. 1—Smillie No. C-1 Automatic Cutter for copper tubing

The type F-2 flaring tool, illustrated in Fig. 2, is for flaring copper tubing $\frac{1}{8}$ in. O.D. to $\frac{5}{8}$ in. O.D. Jaws for holding the tubing while flaring are made in any combination of four sizes from $\frac{1}{8}$ to $\frac{5}{8}$ in. O.D. By continuing to revolve the flaring head the flare is polished to a smooth surface. The necessary flare is usually accomplished by four turns on tubing of $\frac{1}{2}$ in. O.D. and under, and five turns on $\frac{5}{8}$-in. tubing.

The type R-3 reseating tool, illustrated in Fig. 3, has a body of gray iron, the other portions being of steel. The tool can be used in a vise. Adapters for S.A.E. fittings $\frac{1}{4}$ to $\frac{5}{8}$ in. are held in the bottom of the tool by thumb screw. Fittings to be refaced are screwed into the adapter. The seven-tooth cutter, which has a shoulder at the bottom of knurled feed nut, is fed down by the nut until the surface of the fitting is cut smooth. The cutter has a guide

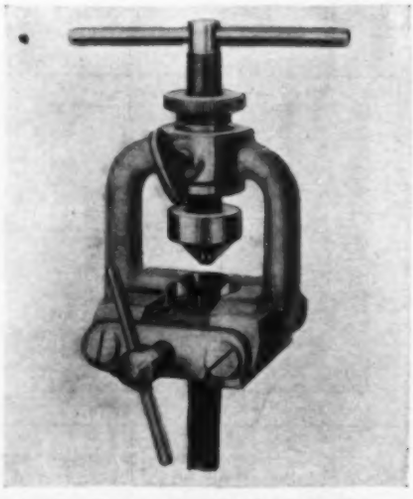


Fig. 2—Smillie No. F-2 Flaring Tool for copper tubing

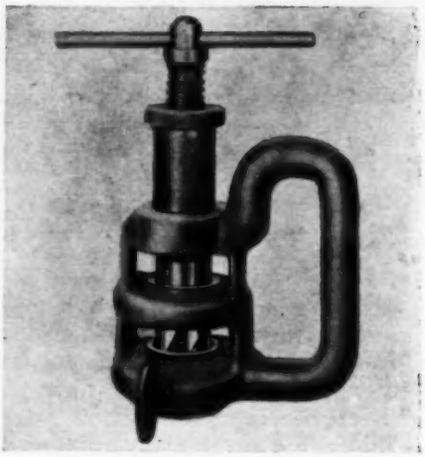


Fig. 3—Smillie No. R-3 Reseating or Facing Tool for S.A.E. fittings

bushing in the body to centralize the cutter and adapter. Extra bushings for the body of the tool are available.

"Tenac" Gear Lubricants

Gear lubricants for all types of heavy, slow-moving, open gears have been developed by the E. F. Houghton & Company, Third, American and Somerset Sts., Philadelphia, Pa., in four grades, under the trade name of "Tenac." They have such characteristics that they are not thrown off the gears while in motion. "Tenac" No. 1 is the heaviest of the series, while No. 4 is the lightest grade. One of the outstanding features is the extremely low cold test of these materials. "Tenac" Nos. 3 and 4, for example, can operate satisfactorily at 20 to 25 deg. lower than most common gear lubricants.

"Doehler-Boston" Die-Cast Stock Gears

Through an arrangement with the Doehler Die Casting Company, die-cast stock gears are now distributed exclusively under the name of "Doehler-Boston" die-cast stock gears by the Boston Gear Works Sales Company, North Quincy, Mass., and its branches. All of these stock gears are cadmium plated to eliminate the possibility of corrosion. Holes are reamed to a limit of plus 0.001 in. minus 0.000 in. for stock gear appli-

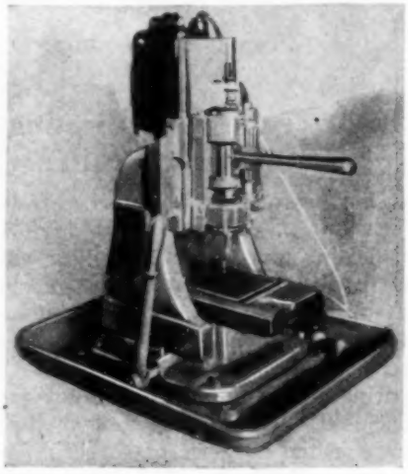
cations, and all surfaces are smoothly finished.

The line consists of 14½-deg. spur gears from 12 to 48 pitch, the largest pitch diameter being 10 in. for a 12 pitch gear having 120 teeth; the smallest pitch diameter in the range being $\frac{5}{24}$ in. for a 48-pitch gear having 10 teeth. Miter gears, bevel gears, and 14½-spur gear racks are also available.

Wade Motor-Driven Bench Profiling Machine

Complete redesign of its bench profiling machine has been made by The Wade Tool Company, Waltham, Mass. The machine is motor driven and employs a ball-bearing spindle. A built-in pump with an oil reservoir in the base are other features.

Pieces to be milled and the guides or patterns are clamped to the lower slide, which moves at right angles to



Wade Redesigned Motor-Driven Bench Profiling Machine with ball-bearing spindle

the horizontal movement of the milling spindle and is operated by a lever.

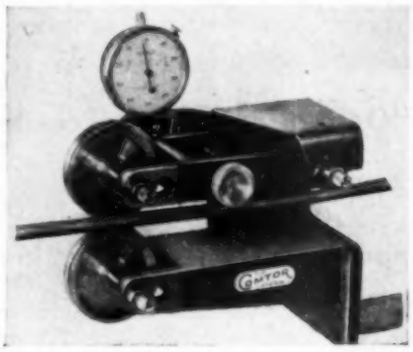
The cutter spindle covers an area of 1¾x4 in., and has a vertical movement of 1¾ in. The machine is particularly suitable for duplicate recesses in blocks or plates, such as die blanks and gun and revolver plates. A cutter spindle is furnished for use in place of the follow pin in cutting master plates.

Specifications: Travel of bed, 4½ in.; travel of cross-slide, 2 in.; travel of bed to spindle, 2 in.; dimensions of base, 17x21 in.; weight, 175 lb.

Model WF "Comtorgage" for Wire and Metal Ribbon

Small resistance wire or metal ribbon can be measured to ten thousandths on the model WF "Comtorgage" built by the Comtor Company, Waltham, Mass. This gage is a modification of the model W intended for insulated cable. Construction is the same, the only change being that the grooved rolls are replaced by flat faced rolls, and the arrangement of the indicating mechanism is slightly modified.

The gage shown is for insulated



cable. The principle of operation is the same for the ribbon measuring device. A thumb wheel serves to raise and to hold up the swing-frame and upper roll while placing the metal ribbon between the rolls. All shafts are of tool steel and all journals are hardened, ground or lapped.

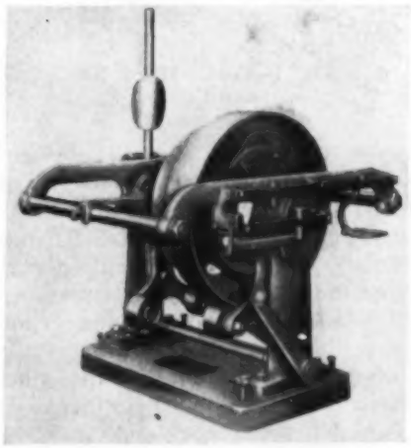
"Production" Motorized Speed Reducer

Motorized speed reducers in capacities up to and including 20 hp. are now available from the Production Equipment Company, 5310 Windsor Ave., Cleveland, Ohio. The motorized speed reducer is a compact unit consisting of standard heavy-duty electric motor with an integral planetary gear reduction unit mounted in an oil-tight casing. All motors are built by the above company, and can be supplied in a single-speed, multi-speed, enclosed and high-torque designs for either horizontal or vertical mounting. Final shaft speeds of 50 to 550 r.p.m. can be obtained.

Zencromatic Static Balancing Machine

Production of some 350 balanced flywheels or clutches per day can be obtained from the static balancing machine developed by the Zencromatic company, subsidiary of the Jenkins Machine Company, Sheboygan Falls, Wis. On this machine, a knife edge is located at the center of the part to be balanced so that the part simply tips. The amount of tipping or turning is small.

The machine does not require any central work arbor. The work rests on two or four rolls, which are adjustable in line with the center of the knife edges so as to bring the work to be balanced in line with them. After the heavy point on the work has been located, the part is turned by hand about 90 deg. and in this loca-



"Zencromatic" Static Balancing Machine

tion the sliding weights are adjusted to effect a balance of the scale beam. This action shows how much material must be removed from the part. If metal is to be removed by means of a certain size drill and at a certain radius, the weights can be made of a standard size so as to have an exact relation to the depth and number of holes required to put the part in bal-

ance. In the case of balancing parts which must have weights fastened on, a weight pan is provided on the bar, and can be adjusted at the same radius where the weights are to be fastened. Thus, it is a simple matter to fill the pan with enough weights to balance the beam and then fasten these weights on the part.

The standard machine is made for parts 20 in. in diameter and in several sizes from 7 to 31 in. in width. The weight is about 175 lb. A drill press attachment can also be furnished to give the high production mentioned above.

Cooke Micro Nut and Cotter

From 14 to 22 adjustments of the castellated nut can be made on the Cooke Micro Nut and Cotter made by the American Railway Products Company, Inc., South Norwalk, Conn. The number of adjustments

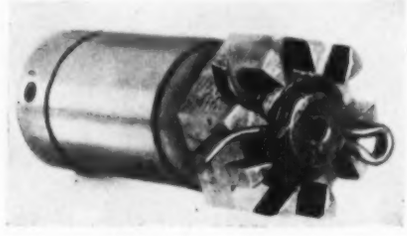


Fig. 1—Cooke Micro Nut and Cotter

depends upon the size of the nut, which utilizes a self-opening and self-retaining type of cotter key. As shown in Fig. 1, the castellated nut is milled so that the castellated portions are of triangular section and so disposed that the apex of one section is at the center of one end of the cotter-pin hole, while at the other end of the cotter-pin hole there is a fully exposed space for the insertion of the cotter pin.

The Micro nut eliminates the necessity of backing off or loosening the nut for adjustment. The range of adjustments of the Micro nut depends upon the size of the nut used. On $\frac{3}{8}$- to $1\frac{1}{4}$-in. castellated nuts, the seven castellated sections give 14 adjustments, while the $1\frac{3}{8}$- to $1\frac{3}{4}$-in. nuts with nine castellated sections give 18 adjustments and on the $1\frac{7}{8}$-in. to $2\frac{1}{4}$-in. nuts the eleven sections give 22 adjustments.

The triangular section with the apex in the center of the cotter-pin hole, Fig. 2, spreads the cotter-pin automatically as it is driven through. The nut does not require a special type of pin, but can be applied to all types of present or new equipment.

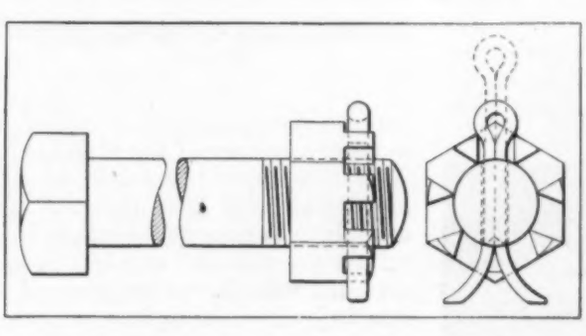
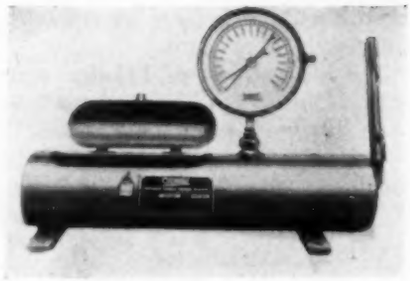


Fig. 2—Showing how the cotter is spread by the triangular section

"Oxweld" Portable Tensile Testing Machine

Improved design is evident in the portable tensile testing machine announced by The Oxweld Acetylene Company, 30 E. 42nd St., New York, N. Y. This machine was originally described on page 858, Vol. 72, of *American Machinist*. It was originally developed in conjunction with the Southwark Foundry & Machine Co., but is now being sold as a standard piece of "Oxweld" equipment. The machine weighs 165 lb. and measures 28 in. in overall length and $6\frac{3}{4}$ in. in maximum diameter. It is a self-contained, totally enclosed unit, and consists of a tubular compression member with a set of grips in the head and a hydraulic cylinder block in the base. The cylinder block contains a communicating pump and cylinder directly machined into a single block, and the cylinder pressure operates a piston carrying a second set of grips.

The specimen is placed between the jaws, which have spring grips. The release valve is then closed and the pump handle, applied at the end of the cylinder, is moved back and forth. A set of conical blocks has also been constructed to fit into the machine head in place of the grips, so that



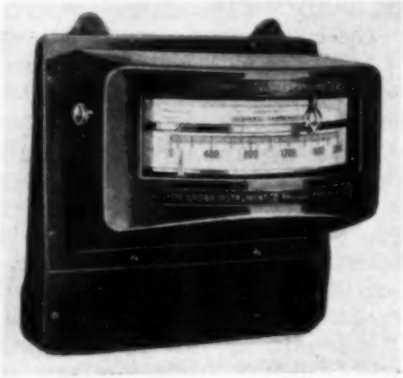
Testing weld blanks is an important use for the "Oxweld" Portable Tensile Testing Machine

standard $\frac{1}{2}$-in. round specimens may be tested. The load is measured directly in pounds per square inch by a suitable, calibrated pressure gage. When a test is finished, the pressure may be released by a valve and the piston returned to its original position by using the pump handle as a lever.

This machine makes it possible to secure a tensile test result immediately after welds are made. This is particularly important in connection with qualification tests for determining welders' ability.

Brown No. 801 Indicating Pyrometer Controller

Readings can be observed directly on the 6-in. scale of the Model 801 indicating pyrometer controller announced by the Brown Instrument Company, Philadelphia, Pa. An index on the scale may be used for setting to the exact control point. All wiring terminals and the motor are enclosed. There is no danger when used in the presence of explosive or inflammable gases. Mercury switches up to 30 amp. capacity eliminate necessity for relay equipment. Thus no danger of sparking is present to



cause explosions. Suitable "on and off" or "three-position" controls can be made through switches, valves and dampers. A safety device opens the furnace circuit if the thermocouple or wiring fails, preventing furnace burn-outs.

"AmerTran" Type B-5 Spot Welder

Compactness is the feature of the type B-5 bench spot welder manufactured by the American Transformer Company, 178 Emmet St., Newark, N. J. The compact sheet-steel case requires a space of only 12x14 in., and it stands 28 in. high. Two electrodes protrude 15 in. from the front of the case. The device operates from a standard 220-volt, 50- or 60-cycle circuit, and is available in three sizes—5, 7½ and 10 kva. Standard equipment includes a pedal control and a six-point primary switch for adjusting the welding current.

"AmerTram" Type B-5 Bench Spot Welding Machine with pedal control

A semi-automatic quick-break contactor opens the primary circuit at will. It also permits the weld to freeze under pressure and prevents arcing at the electrodes. Because the pressure is adjustable for various types of work and is applied by a heavy spring rather than the operator, the machine may be used for welding copper and brass, resistance soldering, and applications requiring heavy pressure.

Various electrodes are available, the type supplied depending upon the character of the work. In all cases the space between the points is adjustable, and, where continuous operation is desired, water-cooled electrodes are provided. The transformer employed is of the short-coupled type; that is, the secondary leads have been made as short as possible to reduce heat losses to a minimum.

The machine is capable of welding two sheets of steel $\frac{3}{16}$ in. or less, or two sheets of copper or brass of $\frac{1}{16}$ in. thickness, with a $\frac{1}{4}$-in. spot weld in each case.

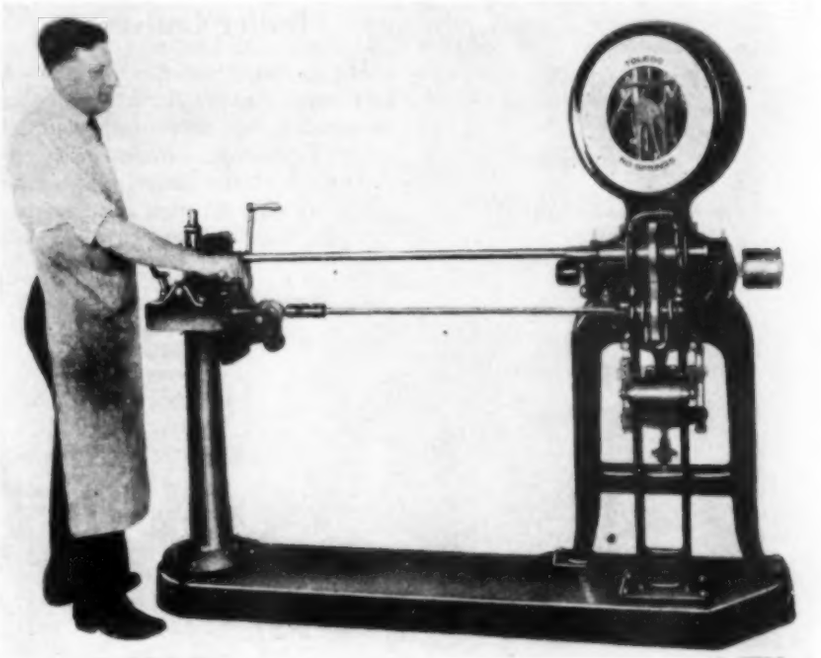
"Vel-Co" Woven Brake Lining

Velvet-like action with a uniform coefficient of friction is the feature of "Vel-Co" woven brake lining announced by the Raybestos Division of Raybestos-Manhattan, Inc., Bridgeport, Conn. This is an asbestos-metallic woven lining having a waterproof, heat-resisting treatment and a large proportion of plastic metal, in addition to the brass wire spun with the asbestos yarn. General characteristics of Vel-Co. and Silver Edge linings are identical. Vel-Co, however, has strands of soft, pliable metal in staggered formation interwoven with the asbestos yarn spun with brass wire. It reduces drum scoring and gives greater resistance to wear. It is manufactured in 50-ft. continuous rolls, obtainable in all sizes from $1\frac{1}{2}$x$\frac{3}{16}$ up to $2\frac{1}{2}$x$\frac{1}{4}$ in.

Toledo Steering-Gear Testing Machine

Checking steering gears for hand power required to turn the wheel can be done on the special equipment developed by the Toledo Precision Devices, Inc., a subsidiary of the Toledo Scale Company, Toledo, Ohio. The amount of play of the steering wheel is also determined readily, and the angular movement on each side of the center of the drag link arm is indicated.

In the operation of this equipment, the housing of the worm sector assembly is first fixed in a quick-operating clamping device. Then the free end of the steering wheel shaft is engaged in a socket connected by a system of gearing to a force measuring and indicating instrument. When the steering gear is in this position, turning the crank will show how much power is required on the steering wheel to turn the steering gear to any



Checking hand power required to turn a steering-gear wheel and making adjustments with the Toledo Steering-Gear Testing machine

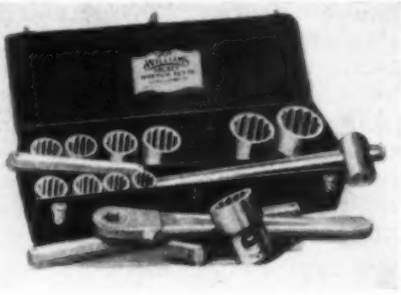
position. Various adjustments may then be made to bring the sector into proper mesh with the worm on the shaft, and the desired resistance to turning, proper wheel play, and correct drag-link arm movement may be inspected. This device is designed so that it can be made to fit any type of steering gear.

Williams Heavy-Duty and Standard Detachable Socket Wrenches

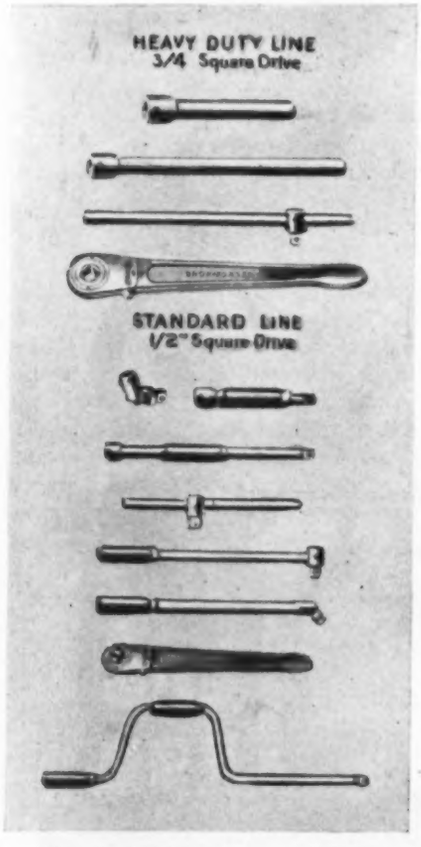
Complete equipment for a variety of work is available in the line of letachable socket wrenches announced by J. H. Williams & Co., Buffalo, N. Y. Three separate patterns of sockets with a full assortment of handles and parts for each cover industrial needs.

Standard pattern socket wrenches have ½-in. square drivers and include sockets with double-hex, hex and square openings up to 1 in. The heavy-duty pattern employs a ¾-in. square driver and the sockets have double-hex openings from ⅞ to 1⅛ in. The extra-heavy-duty pattern is provided with a 1-in. hex drive and sockets with double-hex openings from $1\frac{1}{16}$ to $2\frac{3}{8}$ in.

The use of special alloy steel in the sockets permits their use for rough service, particularly in close quarters. Socket walls are thin and consequently operate in cramped quarters. Five different sets comprising socket drivers and attachments are available. Set No. 75 illustrated contains a complete assortment of 17 pieces, of which 11 are double-hex sockets and six are attachments.



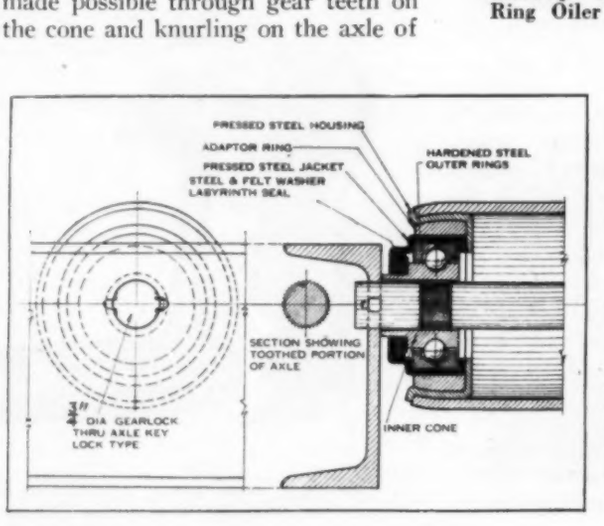
Williams Set No. 75 containing 11 double-hex sockets and six attachments



Panel showing Williams Heavy-Duty and Standard Drivers and Attachments for socket wrenches, which may be combined into a wide range of tools

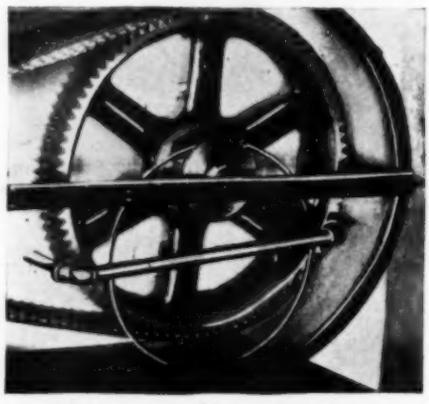
Mathews Heavy-Duty Roller Conveyor

Heavy-duty roller conveyor for extremely heavy service has been announced by the Mathews Conveyor Company, Ellwood City, Pa. A feature of the roller is a gearlock made possible through gear teeth on the cone and knurling on the axle of the conveyor. The lock eliminates the turning of bearing on the axle. Clogging of the conveyor is eliminated by protecting all bearings with a special steel and felt washer labyrinth. These bearings can be packed with grease or furnished with lubrication fittings, if especially heavy duty service is anticipated. Another feature is that one end of the axle is provided with an upset key, fitting into a corresponding slot in the frame rail. This prevents the axle from turning. The opposite end of the axle has a standard cotter key lock. Heavy frames, 0.40 carbon seamless tubing, and heavy cones and races are also employed.



Automatic Ring Oiler for Morse Chain Drives

Running of chain drives in oil baths is not considered advisable by the Morse Chain Company, Ithaca, N. Y., unless the speed is very slow, since all the oil is churned into a mist which may seep out through the case. This churning also oxidizes the oil more rapidly. Dirt in the oil may be carried up and cause unnecessary chain abrasion.



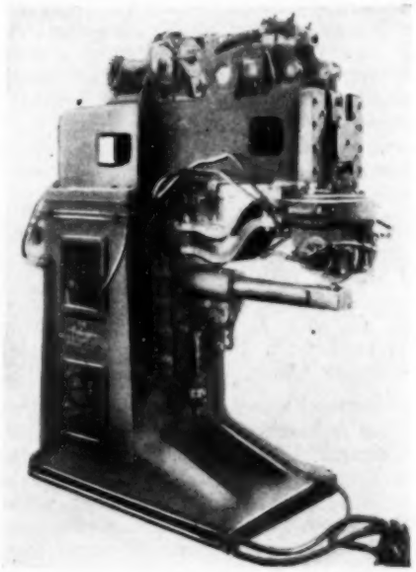
Close-up of Morse Automatic Ring Oiler applied to a chain drive

The automatic ring oiler placed on the market by the above concern is designed so that only clean oil is carried up and into the chain. It is made from rod steel, the ends being sweated

together. This ring travels in a groove turned in the hub of one of the sprockets. Oil is taken off the ring by means of a wiper, and from the wiper it is carried in a pipe to the inside center of the chain.

Federal Seam Welders

Sixteen - point heat regulation through a separate regulating coil is a feature of the seam welders developed by The Federal Machine & Welder Company, Dana Ave., Warren, Ohio. Models of this welder are available from 50 to 150 kw., and can be operated at speeds of 10 to 30 ft. per minute on 16 to 24 gage, respectively. Throat depths from 24 to 48



Federal Special Seam Welder for welding inside a 6-in. corrugated tube

in. are available, and the special machine shown welds inside of a 6-in. corrugated tube.

Features of this machine include pressure supplied by air through a toggle device, water-cooled current carrying parts, and either or both rolls driven according to the requirements of the work.

"Detroit" Live Center

A replaceable cone tip made from 0.008 in. thick phosphor-bronze forms the live member of the "Detroit" live center marketed by the H & L Sales Division of John E. Livingstone & Company, 2-246 General Motors Bldg., Detroit, Mich. This cone tip revolves with the work and forms a bearing against the hardened steel dead center. Such tips last from six to eight hours each on heavy automotive production, such as crankshaft, camshaft, and rough grinding operations, and comparatively longer on lighter jobs. When worn they are renewed by unscrewing the retainer cap.

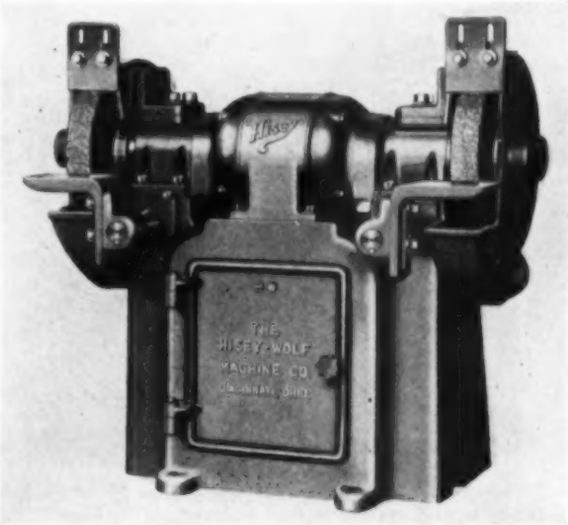
Detroit Live Center. The phosphor-bronze tip is in the center of the group

The "Detroit" live center prevents chatter when using Carboloy tools, because the job is drawn up snug. It need not be backed off as with dead centers, and no "feel" is necessary. Concentricity falls within 0.001 in. on roughing, with greater accuracies for light turning and grinding. Such centers are stocked with Nos. 2, 3, 4 and 5 Morse tapers. Brown & Sharpe, Reed, Standard, Jarno, and other special tapers can also be furnished.

Hisey-Wolf 5-, 7½- and 10-Hp. Floor Stand Grinders

Guards on the three heavy-duty, floor stand grinders announced by The Hisey-Wolf Machine Company, Cincinnati, Ohio, are supported by two heavy steel brackets, with the result that the mounting of each guard is as rigid and as strong as the guard itself. The steel plate guards are adjustable. Heavy steel tool-grinding rests are provided, and are adjustable and removable. Other features include a large door for access to the motor starter, a large spindle and large spindle bearings, and feed wires encased in conduit.

The 5-hp. machine is equipped with 18x 3x1½-in. hole wheels, the 7½-hp. model with 20x4x1¾ - in. wheels and the 10-hp. model with 24x4x2¼-in. wheels. No load speeds of the three models are 1,140, 1,140, and 900 r.p.m., respectively, and the distances between the wheel centers are 43, 44 and 44 in. The net weight ranges from 1,650 to 2,000 lbs.

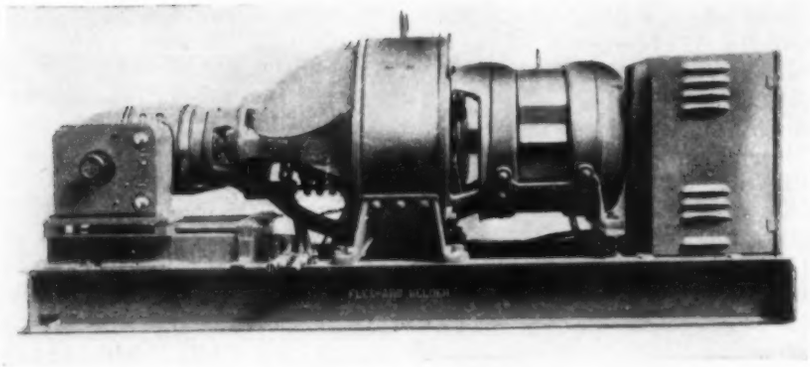


Hisey-Wolf Floorstand Grinder, available in 5-, 7½-, and 10-hp. sizes

Westinghouse 600-Ampere Welder

The trend toward higher welding currents for use with large-size metallic and carbon electrodes has caused the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., to bring out a 600-amp. welder of the "FlexArc" type. This machine is designed to handle various sizes of electrodes, including bare and special-coated rods requiring current values up to 750 amp. Either electric-motor or gasoline-engine-driven models in stationary or portable types are available.

The motor and generator have a common shaft with two bracket-type bearings and a two-bearing exciter overhung from the commutator end of the main generator. The "Flex-



Westinghouse 600-Ampere Welder

actor" provides non-surge welding circuit and arc stabilization. It is mounted on the welded channel base under the exciter. Control apparatus is enclosed in a sheet-metal cabinet. A push-button-operated, magnetic-type starter is provided for the driving motor.

The overall dimensions of the stationary motor-driven unit illustrated are 96x28x40 in., and the weight is approximately 4,500 lb.

PATENTS

NOVEMBER 4, 1930

Metal-Working Machinery

Feed Control Means For Turning Machines. Carl L. Matthison, Rockford, Ill., assigned to Mattison Machine Works. *Patent 1,780,203.*

Radius-Template-Grinding Machine. Hilding Valdemar Turnebohm, Gottenborg, Sweden, assigned to Aktiebolaget Svenska Kullagerfabriken, Gottenborg, Sweden. *Patent 1,780,211.*

Feeding Mechanism for Presses. Raymond T. Anderson, Cleveland, Ohio, assigned to The V. D. Anderson Company. *Patent 1,780,218.*

Grinding Machine. Henry H. Yerk and William J. Baumberger, Davenport, Iowa, assigned to Micro Machine Co. *Patent 1,780,288.*

Gear Grinding Machine. Eyvind Finsen, Rochester, N. Y., assigned to Gleason Works. *Patent 1,780,350.*

Wireworking Machine. William M. Birch, Crawfordsville, Ind., assigned to Mid-State Steel & Wire Co. *Patent 1,780,374.*

Lathe and Lathe Chuck. George F. Hopkins, Jackson, Mich. *Patent 1,780,390.*

Metal-Sawing Machine. Charles Rasmussen, Racine, Wis., assigned to Ralph T. Ingalls. *Patent 1,780,439.*

Machine for Making Spaced Coiled Filaments. Sten Waldsten, Bloomfield, N. J., assigned to Westinghouse Lamp Co. *Patent 1,780,609.*

Testing Machine. Alfred J. Amsler, Schaffhausen, Switzerland. *Patent 1,780,696.*

Ingot-Stripping Mechanism. Walter D. Keller and William L. Poto, Alliance, Ohio, assigned to The Alliance Machine Co. *Patent 1,780,787.*

Circular-Saw-Sharpening Machine. John F. Pribnow, San Diego, Calif., and Eugene F. Mitchell, Spokane, Wash. *Patent 1,780,886.*

Metal-Working Machine. Robert S. Brown, New Britain, Conn., assigned to The New Britain-Gridley Machine Co. *Patent 1,780,889.*

Tools and Attachments

Cutter Head. Alex A. Clarke, Chicago, Ill. *Patent 1,780,170.*

Reamer. Willard M. McBride, Pittsburgh, Pa. *Patent 1,780,240.*

Corner Die. James A. McGregor, Cleveland, Ohio. *Patent 1,780,432.*

Die for Flanging Sheet Metal. James A. McGregor, Cleveland, Ohio. *Patent 1,780,433.*

TRADE PUBLICATIONS

BEARING BRONZES. The U. S. Department of Commerce, Bureau of Standards, has published Research Paper No. 205 entitled "Bearing Bronzes with Additions of Zinc, Phosphorus, Nickel, and Antimony." Tests made included wear resistance, resistance to impact, Brinell hardness, and resistance to repeated pounding at several temperatures.

BRASS & BRONZE CASTINGS. William H. Barr, Inc., Buffalo, N. Y., has available a booklet "Useful Data Concerning Brass & Bronze Castings," which supplies accurate information regarding many of the standard non-ferrous casting alloys.

BROACHING. The Connecticut Broach & Machine Co., New London, Conn., is now publishing a house organ known as "Better Broaching," available to interested persons. Much information on broaching kinks is found in each issue.

COMPRESSORS. The Pennsylvania Pump & Compressor Co., Easton, Pa., now has available bulletin No. 151 on duplex air and gas compressors. Complete information is given on the construction of these compressors, the drive, and specifications.

GEARS. The Boston Gear Works Sales Co., North Quincy, Mass., has issued a bulletin on "Doehler-Boston" Die-Cast Stock Gears. Spur gears, racks, and miter gears are available, none being more than 10 in. in diameter.

NEMA STANDARDS. The National Electrical Manufacturers Association, 420 Lexington Ave., New York, N. Y., has issued "Nema Motor and Generator Standards," publication No. 30-2, as of October, 1930. The price is $1.50.

NICKEL STEEL. The International Nickel Co., Inc., 67 Wall St., New York, N. Y., has available a Buyer's Guide—Fall Issue, 1930—which is a directory of manufacturers, fabricators and distributors of nickel alloy steel products.

SCREW THREADS. The U. S. Department of Commerce, Bureau of Standards, has issued Commercial Standards CS25-30, entitled "American National Special Screw Threads." It is effective as of July 1, 1930. Copies can be secured from the U. S. Government Printing Office, Washington, for $0.15.

SPEED REDUCERS. The Foote Bros. Gear & Machine Co., 111 N. Canal St., Chicago, Ill., has issued catalog No. 102 on "IXL Titan" herringbone or helical speed reducers for heavy-duty drives. A general discussion of the design features is given. Dimension and rating tables are included as well as photographs of installations.

STEELS, S.A.E. SPECIFICATIONS. The International Nickel Co., Inc., 67 Wall St., New York, N. Y., has issued Bulletin No. 1-A describing in convenient form the S.A.E. system of specifications for chemical compositions and inspection standards for carbon and alloy steels. It has been brought up to date from an earlier bulletin.

WESTINGHOUSE GENERAL CATALOG. The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has issued a general catalog for 1931-1932, comprising 1,352 pages presenting descriptions and illustrations of the apparatus manufactured. A feature is the "Instant Index," which lists the 24 groups of equipment described and from the name of each group an arrow points to the index above the section of the book covering that equipment. Style numbers are given for standard equipment.

NEWS OF THE WEEK

President's Unemployment Committee Perfects Its Organization

WASHINGTON, D. C., Nov. 11—The Presidential Unemployment Committee, headed by Colonel Woods, has named Percival White, known in industrial circles for his scientific management work, as assistant to Edward L. Bernays, Publicity Director for the committee. Mr. White will remain in Washington; Mr. Bernays will divide his between New York and Washington.

Ultimately, the work of co-ordinating the drive against unemployment will be decentralized through five or seven regional directors. Only two have so far been named, Frederick C. Croxton of Columbus, Ohio, and Frank Bane, Commissioner of Public Welfare of Virginia. Mr. Croxton is director of the central lake states area, Mr. Bane of the southeastern states region. Meanwhile, James C. Lawrence of the University of Minnesota will be chief of a central clearing house to interchange information between regions, and Sewell Avery, President of the U. S. Gypsum Products Co., Chicago, is head of the industrial division.

In 1921, the President's Conference on Unemployment had to start from scratch. Col. Woods finds it is relatively easy to reconstruct that organization. State and municipal authorities and business men throughout the country, by their knowledge of the operation of the 1921 machine, were able to go ahead promptly. In fact, some of the state and municipal committees revived their organizations early in the depression and have been working actively for the past year. In addition, the Committee on Recent Economic Changes, an outgrowth of the 1921 conference, has been going ahead continuously with its studies of the whole subject of economic balance. A great fund of information which the 1921 conference did not have has been made available to the 1930 agency.

The Chicago & North Western Railway has secured the co-operation of the Interstate Commerce Commission in its plan to provide employment during the next two months by making repairs to equipment not now in service. The road has been permitted by the Commission to charge to suspense account $500,000 to be spent for labor and material or idle equipment during the next two months. A number of other organizations are planning similar projects, including E. I. du Pont de Nemours & Co. Other organizations are utilizing stagger systems of employment, guaranteed employment, and various employee relief measures.

The White House announcement that a billion dollar program of public works is under contract and that employment is being provided for a million persons indicates that the federal government is carrying its full part of the load, but it emphasizes also that public works, at best, constitute only a small proportion of the normal activities of the country. The normal volume of engineering work in the country is more than $10,000,000,000. While the total gainfully employed in 1929 is estimated to have been 45,000,000.

One of the significant features of the announcement is the rapidity with which the public works program has been expanded. In nine months the increase in government work was 38 per cent.

Whether or not European exports to world markets declined more than American exports during the first six months of 1930 will be revealed by a special study which is being made by the foreign trade division of the Commerce Department. Tentatively it is shown that some European countries actually increased their exports during the first six months of 1930, as compared to the similar period of 1929. The countries that have indicated this gain, however, are minor factors in the activities of world trade. They are Hungary and Roumania.

It also is indicated that the decline in European exports has not been as great as the decline in American exports. This is probably due to the fact that American exports had a higher peak from which to fall. While much attention is being paid to the present economic condition in Germany, it is stated that the figures already disclose that the German exports are bearing up fairly well. According to present plans the report on the survey will be made public on November 17.

Hon. Marcus A. Coolidge Elected Senator

Hon. Marcus A. Coolidge, who became manager of the Fitchburg (Mass.) Machine Works when it was in financial difficulties and restored the business, recently defeated Senator Butler of Massachusetts by a plurality of 112,437 to win the junior senatorship of the state. Mr. Coolidge is a former mayor of Fitchburg, and has been identified with a number of prominent machine tool plants.

THE Standing Committee on Sheet Steel of the Division of Simplified Practice, U. S. Department of Commerce, has reaffirmed Simplified Practice Recommendation R28-29 on Sheet Steel without change for one year.

With a capacity to plane work 12 ft. wide, 10 ft. high, and 30 ft. long, the first of the new line of Gray "Ultra-Size" planers has been shipped to the Niagara Machine & Tool Works. From left to right, on the floor, are Henry Marx, Forrest Cardullo, August Marx, and John Doran. Directly above Henry Marx is Charles Hummell, and at his left John Walters

Machinery Exports Above Normal Levels

With the exception of last year's abnormally large total, United States exports of industrial machinery are being maintained well above the level of any other year since 1921, according to statistics for the first nine months of 1930, compiled by the Industrial Machinery Division, U. S. Department of Commerce. Industrial machinery exports during the current year's period declined 5 per cent from the high total of the corresponding period of 1929, but registered a gain of 19 per cent over the 1928 period, the previous peak year. The total for the current year's period is $180,014,000, as compared with $189,427,000 in 1929 and $151,802,000 in 1928.

Foreign shipments of construction, well and refinery, and metal-working machinery showed such exceptional activity during the first half of 1930 that despite subsequent decreases, the trade in these groups for the nine months ending in September exceeded all records since the post-war boom year 1921. Exports of construction machinery for the first nine months show a gain of nearly 10 per cent over the high level of the similar period of last year. The trade in excavators, power shovels, and dredges was largely responsible for this unusual showing. Foreign shipments of conveying machinery have fallen off about 6 per cent, but cranes have held up strongly, accounting for a total value of $1,913,000 for the nine months, as compared with the abnormally large total of $2,223,000 for the 1929 period. Hoists, other than monorail, have increased from $1,041,000 to $1,156,000,

Exports of metal-working machinery for the nine months were the greatest since the abnormal post-war year of 1919. This record is the result of the volume of exports during the first six months of 1930, which was more than sufficient to offset losses during the third quarter. The unusual volume of shipments to Soviet Russia in Europe largely accounted for this activity, reaching a total value of $8,903,000 for the first half of 1930, as compared with a value of $2,620,000 for the entire year of 1929. The machinery was destined principally for installation in Russian tractor and automobile plants.

National Founders Announce Program

The National Founders Association, of which Thomas S. Hammond of the Whiting Corporation is president, is holding its 34th Annual Convention at the Hotel Astor, New York, N. Y., from Nov. 19-20. The call to order will be at 10:30 a.m. on Wednesday morning, Nov. 19. Joint reports of officers will be given by Thomas S. Hammond, and a report of the Industrial Education Committee will also be presented. Dr. Harry Myers will speak on "Progress and Prosperity." At the afternoon session on that day, Charles Nagel of Nagel & Kirby will speak on "Constitution Day," and Walter Case, of Case & Pomeroy, will speak on "New Problems in World Industry." Thomas Campbell will speak on "What the Farmer Really Needs," and T. Yeoman Williams will speak on "Unsound Economic Practices in Electrical Construction."

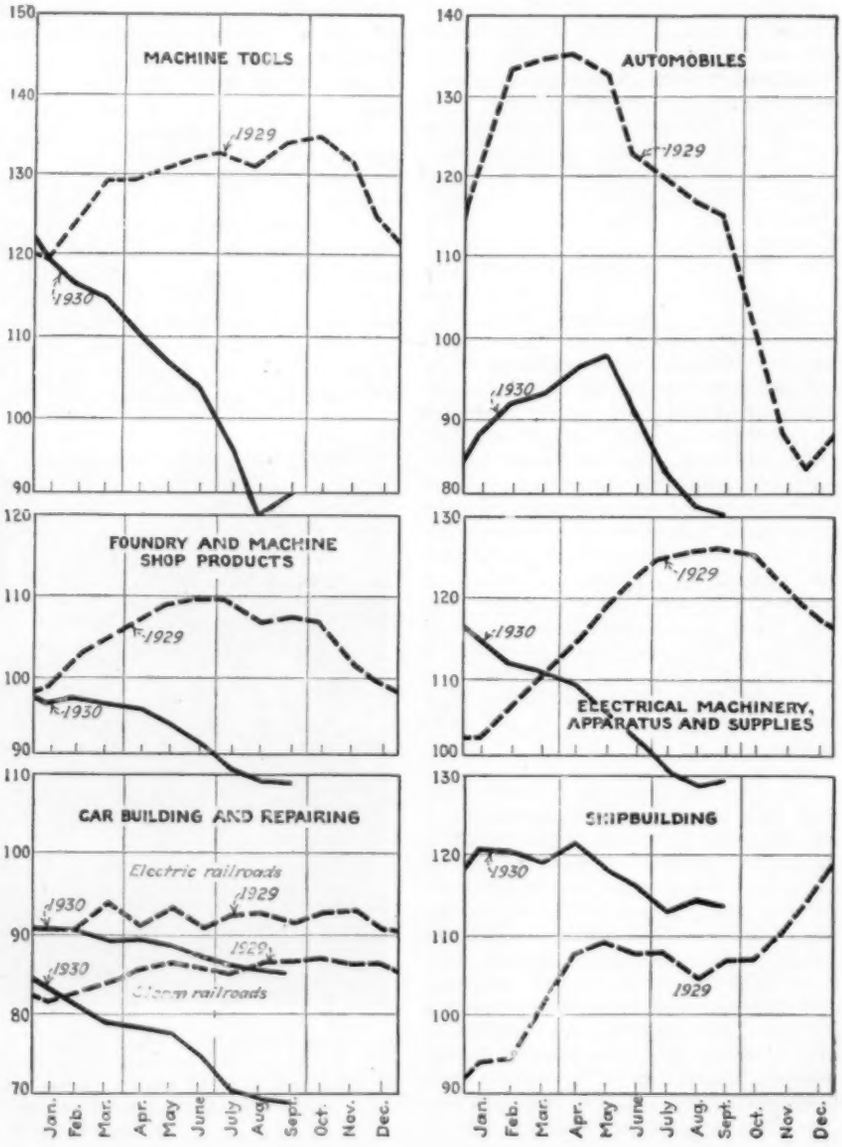
The Convention Dinner will be held at the hotel that evening at 7 o'clock. Thomas S. Hammond will act as toastmaster, and Edward Grant Conklin, Professor of Biology, Princeton University, will speak on "The Human Melting Pot." John L. Carter, chairman of the Committee on Foundry Costs, will preside at the Convention Breakfast the following morning. William C. Wright, Consulting Foundryman of the Association, will speak on "Money Savers for the Jobbing Foundry," and Robert E. Moore, Vice-President of the Flockhart Foundry Co., will speak on "A New Use for Gray Iron." Richard S. McCaffery, Professor of Metallurgy, University of Wisconsin, will speak on "Technical Leadership in the Foundry Industry."

THE Seventh Annual Del Monte Iron & Steel Conference of the California State Chamber of Commerce will be held at Del Monte from Feb. 12-14, 1931. Charles S. Knight, Director of the Industrial Department of the State Chamber, is secretary of the Iron, Steel and Allied Industries of California.

Trend of Employment In the Metal-Working Industries

Data Supplied by the Bureau of Labor Statistics

Monthly average for 1926 = 100



A.S.M.E. Announces High-Lights Of 51st Annual Meeting

OF ALL events of the annual meeting of the A.S.M.E., during the week of Dec. 1, the dinner to new members at the Hotel Astor on the evening of Dec. 3, promises more than any one other, according to the Society. On this occasion, Admiral David Watson Taylor, naval constructor, will be awarded the John Fritz Medal, the highest honor in the gift of the engineering profession. Elliott Dunlap Smith, Director of Industrial Investigations of the Institute of Human Relations, and Professor of Industrial Engineering at Yale University, will deliver an address on "Engineering Encounters Human Nature." Professor Smith is a man of outstanding social consciousness and will show how potent the engineer really is in the social problems of the day, and how great is his opportunity.

ELIHU THOMSON
Who is to receive honorary membership in the A.S.M.E.

Ely C. Hutchinson, Editor of *Power*, will be toastmaster at the dinner. Conrad N. Lauer will extend a welcome to the new members, and Charles E. Gorton will bestow special badges upon those who have been members of the Society for fifty years. These three men are all officers of the Society.

Several additional events new to A.S.M.E. meeting programs will also be included on three mornings prior to the technical sessions. Dr. S. Marion Tucker, Head of the Department of English of Polytechnic Institute, Brooklyn, will deliver lectures on "Talking with an Audience."

Another feature will be an Exhibition of Art by Engineers. It will include paintings, etchings and sculpture. Works of more than a score of engineers have already been offered for display, and further contributions are expected.

President's Night will be the occasion of a discussion between an economist and an engineer concerning the parts these two professions play in our present civilization. Dr. Wesley C. Mitchell, Director of the National Bureau of Economic Research, and Ralph E. Flanders, Vice-President of the A.S.M.E., will be the speakers. At this time also honorary membership in the Society will be conferred upon Elihu Thomson.

Financial Notes

Orders received by the Westinghouse Electric & Manufacturing Co., declined from $185,625,135 in 1929 to $132,715,293 in 1930, according to a recent condensed statement of operations. The 1928 figure for the same period was $143,637,037. Sales billed in 1930 were $137,446,908, as compared with $159,545,778 in 1929 and $138,572,390 in 1928. Net income after depreciation, reserves, and taxes was $11,355,619 in 1930, as compared with $19,796,819 in 1929, and $15,425,424 in 1928.

Sales of 244,378 units in the third quarter of this year by General Motors compare best with sales of 222,839 units in the third quarter of 1925. At the same time, the corporation's net profit of $25,470,697 compares with $30,557,919. Sales and earnings were generally at low levels during the third quarter of this year, levels which have not been approached previously for this period since 1925. For the first nine months, however, the corporation's sales and earnings were somewhat larger than during the corresponding period of five years ago. Cash, Government and other securities on Sept. 30 last amounted to $202,064,960, as compared with a total of $145,142,088 on Dec. 31, 1925. Net working capital was $285,777,740, as compared with $181,826,881.

Class I railroads of the United States for the first nine months this year had a net railway operating income of $659,427,561, which was at the annual rate of return of 3.54 per cent on their property investment, according to reports just filed by 171 carriers with the Bureau of Railway Economics. In the nine months of 1929, their net railway operating income was $962,854,453 or 5.29 per cent on their property investment. Gross operating revenues for the first nine months of 1930 totaled $4,082,725,729 compared with $4,781,684,238 for the same period last year, or a decrease of 14.6 per cent.

Branch Plants In Canada

E. C. Strong, Vice-President of The Sherman Corporation, Canada, Ltd., 408 Metropolitan Bldg., Toronto, Ont., has written an article entitled "Manufacturing Opportunities in Canada" in the October issue of "Agricultural and Industrial Progress in Canada," a monthly review published by the Department of Immigration and Colonization of the Canadian Pacific Railway at Montreal, Canada. The article takes up a subject which at this time is of interest to most American manufacturers, the establishment of branch factories in Canada to manufacture for the domestic market of the Dominion and to take advantage of preferential tariffs and foreign trade arrangements which Canada enjoys in exporting to foreign countries. Mr. Strong states that it is a fact that American manufacturers are far from realizing the full extent of the commercial opportunities awaiting them in the Dominion, despite the fact that there are at least 1,500 branches of United States firms in Canada.

Electrotechnicians Adopt New Definitions

International agreement on the definitions and names of additional magnetic units was reached by the International Electrotechnical Commission at its Plenary Meeting in Oslo in July of this year. This constitutes a further advance in the standardization of electromagnetic units brought about through the efforts of the Commission. Definitions and symbols for the various units and an outline of the progress at the meeting are included in a recent report by A. E. Kennelly, Chairman of the Subcommittee on Magnetic Units of the United States National Committee, I.E.C., which is available from H. S. Osborne, Secretary, 33 W. 39th St., New York City.

British Purchase Finished Manufactures

That future expansion of the United States export trade with the British market is likely to be in the field of finished manufactures is indicated in an economic handbook of the United Kingdom which the U. S. Commerce Department has just released. The trend toward increased purchases of American manufactured goods and declining imports of unmanufactured and semi-manufactured products has been evident during the post-war era, the handbook reveals. American high-grade specialties constitute the class of exports from this country which are steadily gaining favor among the British. The introduction of many of these articles necessitates an extensive educational campaign and immediate sales may not appear to justify the expense entailed. However, experience has shown that an article which fails to arouse immediate interest may do so in a marked degree a few years later. The handbook was prepared by various officers of the Commerce and State departments under the direction of Hugh Butler, Trade Commissioner at London.

BUSINESS ITEMS

The American Bosch Magneto Corporation, Springfield, Mass., and the Robert Bosch Magneto Co. are to be merged under the name of the United American Bosch Corporation if stockholders approve at a special meeting Nov. 18. The announced plan contemplates the elimination of the word "Magneto" from the corporate title in line with the broadening activities of the company. The United American Bosch Corporation will become exclusive sales outlet in American territory for all products of Robert Bosch A.G. of Stuttgart, Germany, while that company will in turn sell products of the American Company through its many European sales branches. Arthur T. Murray will be president of the American Corporation; Morris Metcalf, vice-president and treasurer; Louis Beeh, G. J. Lang, Leon W. Rosenthal, Herman Waker, J. E. Wild, vice-presidents; R. W. Washburn, secretary and assistant treasurer.

The Universal Machine Co., Baltimore, Md., has taken over the first floor of 317 S. High St., and equipped it for general machine work.

Ray Phelps, Beloit, Wis., is erecting a 2-story shop, 30x50 ft., with two 1-story wings, each 30x100 ft., on a new site on Yates Ave. & Argall St.

The Spring City Foundry Co., Waukesha, Wis., is planning a one-story foundry addition.

H. F. Wolf, 125 E. York St., Baltimore, Md., has equipped a foundry, making a specialty of brass and aluminum castings.

The Anaconda American Brass, Ltd., has decided on immediate construction of a brass and copper tube mill as an extension to its plant at New Toronto, Ont. The new unit will cost in the neighborhood of $500,000. Necessary machinery, steel girders, and other equipment has already been ordered, and actual erection of the tube mill will commence as soon as weather conditions are favorable.

William W. Hearne, Inc., Philadelphia, has moved its headquarters from the Real Estate Trust Bldg., to 814 Pennsylvania Bldg.

Manning, Maxwell & Moore has been appointed Chicago representative of the DeVlieg Machine Tool Co., Jackson, Mich.

H. S. Moos of Zurich, Switzerland, has been appointed exclusive European representative of the Siewek Tool Co., Detroit, Mich.

The Uhlin Machine Works, Wilmington, Calif., has removed its shop to 320 "B" St.

Western Metal Crafts Inc., is to construct a plant on 37th St., Vernon, Los Angeles.

The Moore Drop Forging Co., Springfield, Mass., has taken out a permit for the construction of a 1-story brick and steel addition which will cost $17,000.

Officials of the Fort Wayne (Ind.) Foundry & Machine Co., have filed papers with the secretary of state in Indianapolis evidencing the preliminary dissolution of the corporation.

The Montreal office of the Horton Steel Works, Ltd., has been moved to the University Tower Bldg. This office is in charge of A. P. Blackburn.

PERSONALS

R. G. Adair, staff supervisor of safety and training, American Rolling Mill Co., Middletown, Ohio, has been appointed assistant to the works manager of the Butler, Pa., plant.

L. D. Anderson, T. J. Burke, W. T. Clarke, N. H. Lagerstrom, O. J. Menke, and L. V. Workman have been added to the Russian staff of the Freyn Engineering Co., Chicago, and will sail for Leningrad on Nov. 15.

L. S. Cusato of the General Electric Co., Pittsfield, Mass., has been appointed superintendent of Division No. 1, to succeed A. M. Jones who has been assigned to the staff of the general superintendent. Mr. Cusato started with the General Electric Co. in 1906.

Williard H. Dow, son of the late Dr. Herbert H. Dow, founder of the Dow Chemical Co., Midland, Mich., has been elected president and general manager to fill the vacancy caused by the death of his father. He was formerly assistant general manager.

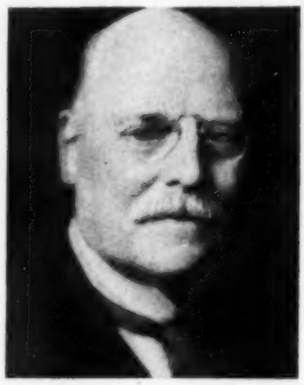
E. S. Evans, president of the Detroit (Mich.) Aircraft Corporation, resigned effective Nov. 1. He was elected chairman of the board.

Julian B. Greenstreet, superintendent of the Olney Foundry Co., lead a discussion on "The Operation of the Cupola" at the Nov. 12 meeting of the Philadelphia Foundrymen's Assn., held at Fox Chase, Pa.

Elmer P. Grismer has been appointed general sales manager of the R. D. Haskins Co., Chicago. Mr. Grismer will concentrate on the Industrial Division. L. D. Bowden has been appointed sales manager of the newly formed Automotive Division. Mr. Bowden formerly handled general sales in the Chicago and South Bend territory.

Earle S. Henningsen has been appointed engineer of the alternating current engineering department of the General Electric Co., to succeed H. G. Reist, who has retired.

Reginald Belfield, distinguished English electrical engineer, who brought to America, in 1885, the original Gaulard & Gibbs apparatus from which George Westinghouse developed his alternating-current system, spent a few weeks in the United States recently at the time of the unveiling of the Westinghouse Memorial. Mr. Belfield remained in America from 1885 to 1889, when he was made chief electrician of the Westinghouse Electric Co. Ltd., of



London. He was later associated with the British Westinghouse Co., and until Mr. Westinghouse's death, in 1914, was his personal representative in Europe.

Carl A. Johnson, associated with the Hyatt Roller Bearing Co., for the past 13 years, was appointed director of sales of the Roller Bearing Co. of America on Nov. 1. John J. Berliss was elected general manager of the Roller Bearing Company recently. He has been treasurer for the past 12 years and will continue to fill that position.

Prof. Alexander Klemin of the Guggenheim School of Aeronautics, New York University, and Secretary of the Aeronautic Division, A.S.M.E., will speak on "Japanese Aeronautic Research by High-Speed Photography" at a meeting of the Metropolitan Section, A.S.M.E., on Nov. 18. A. A. Gassner, Chief Engineer of the Fokker Aircraft Co., will lead a discussion on "Airplane Weights" at the same meeting.

Charles E. Kraus, Louisville, Ky., has recently invented a rotary gasoline motor without pistons, connecting rods, crankshafts, or timing gears. The motor is air-cooled, uses gasoline as a fuel, is controlled the same as any automobile motor, and has an electric starter.

W. L. Krug, former malleable iron foundry superintendent of the McCormick division, International Harvester Co., Chicago, has been appointed in a similar capacity in the foundry of William E. Pratt Manufacturing Co., Joliet, Ill., to succeed the late James Beaman.

Elmer Lunderville, Manager of the rock-drill and mining-machinery department of the Canadian Ingersoll-Rand Co. Ltd., Montreal, has been transferred to the Toronto office as branch manager.

Sam Laud was elected executive assistant to the president, and Herman Altschul was made assistant to the president, of the General American Tank Car Corporation, Chicago, at a recent meet-

ing of the board. R. C. Pierce was elected vice-president in charge of engineering and research, and A. A. Selonke was made assistant comptroller. Lester N. Selig, formerly assistant to the president, was recently elected president in succession to Elias Mayer, resigned.

Paul L. Price, treasurer and general manager of the Irving Iron Works Co., New York, has been made a vice-president in charge of research and development. He will also continue as chief engineer.

B. C. Palmer, special sales engineer for the Ohmer Fare Register Co., Dayton, Ohio, has been transferred to Chicago to supervise the business offices there and to continue as general sales manager for recording devices.

E. D. Punthley has been appointed Detroit district sales manager, with offices at 2343 Union Trust Bldg., Detroit, of the Corrigan, McKinney Steel Co., Cleveland.

G. R. Southee, manager of the Toronto branch office of the Canadian Ingersoll-Rand Co., Ltd., has been transferred to the company's head office in Montreal, where he will be assistant to the vice-president.

Geoffrey and Spencer Summers, directors of the John Summers & Sons Co., Ltd., England, are now on a business visit to the United States, visiting in particular the American Rolling Mill Co., Middletown, Ohio, regarding an expansion program for the manufacture of high-finish sheets in Great Britain, in which the two firms are jointly interested.

E. F. Sands, on Oct. 28, celebrated his fiftieth anniversary with the firm of

Robinson, Cary & Sands Co., machine tool dealer organization of St. Paul-Minneapolis.

Guy Wainwright of Indianapolis, an official of the Diamond Chain Co., has been named chairman of a special employment commission, appointed by the state commander of the American Legion to assist World War veterans in obtaining work.

G. Van Dyke, manager of the Special Steels Department of Joseph T. Ryerson & Son, Chicago, has been delivering a number of lectures at various points throughout the country on alloy steels, tool steels, and "stainless" steels. Recent meetings have been held in Minneapolis, Cincinnati, and Milwaukee when he spoke to about 200 engineers and shop men on each occasion. The talk and demonstration was originally

prepared for Ryerson salesmen and service men to cover two days, but has now been boiled down to about three hours on the lecture and two hours on practical demonstration and instruction including welding.

OBITUARIES

Charles H. Booth, 69, for many years a director of the Youngstown (Ohio) Sheet & Tube Co., died on Nov. 6 of heart disease after a long illness.

E. J. Campion, 52, superintendent of the Canadian Steel Foundries Ltd., Montreal, Que., died at Cleveland recently. He became identified with the Canadian Steel Foundries Ltd., as assistant superintendent in 1917.

Frederick P. Fish, 75, former president of the American Telephone & Telegraph Co., died at his home in Brookline, Mass., on Nov. 6. He was president until 1907, and before that time had been a well-known patent lawyer.

J. R. Fleming, 73, mine equipment manufacturer for more than half a century, died on Nov. 5 in Stratford, Pa., after a brief illness.

Albert Graham, 82, who became connected with the bolt and nut industry in 1881 with the firm of William Charles & Co., died in Pittsburgh on Oct. 28. At the time of his death, he was the oldest bolt and nut manufacturer in the United States. He was head of the company, which later changed its name to the Graham Nut Co., until 1922, when he retired.

William F. Hess, 39, general manager of the National Aluminum Co., Cleveland, died suddenly at Akron, Ohio, on Oct. 30, where he had gone on business.

William Piez, 52, European correspondent of the Link-Belt Co., Chicago, and a brother of Charles Piez, chairman of the board, Link-Belt Co., died at Brussels, Belgium, on Nov. 2 after a week's illness. He had been in Paris since 1928.

Charles M. Wales, 68, New York representative for many years of the Cleveland City Forge and the Otis Steel Co., died suddenly on Nov. 1 in Englewood, N. J., of pneumonia, after a brief illness. At the time of his death he was New York representative for the Wheeling Mold & Foundry Co.

Arthur E. Wilson, 46, founder and president of the Wilson Co., Indianapolis, died recently at his home after an illness of about a week.

Robert H. Thorne, founder and president of the Darling Valve & Manufacturing Co., Williamsport, Pa., died at his home there on Oct. 27, following a month's illness. He organized the company in 1888.

Harry F. Wahr, 47, president of the Mesta Machine Co., West Homestead, Pa., died unexpectedly on Nov. 5 at his home in that city. He had been elected president five years ago, and had been in poor health for a year.

Wilton L. Richards, 71, who had been with the Bell System for 52 years, and a worker in the shop where the first telephone instrument was developed, died in Brooklyn, N. Y., on Nov. 7.

James T. Wallis, 62, assistant vice-president in charge of operation of the Pennsylvania Railroad since 1927, died on Nov. 7 at his home in St. Davids, Pa. He had been with the railroad for 40 years.

FORTHCOMING MEETINGS

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Calvin W. Rice, executive secretary, Engineering Societies Bldg., 29 West 39th St., New York, N. Y. The following meetings are scheduled:

Fifty-first annual meeting, Engineering Societies Bldg., Dec. 1-5.

Semi-Annual meeting, Birmingham, Ala., Apr. 20-23, 1931.

National Materials Handling Meeting and Management congress, Cleveland, Ohio, Apr., 1931.

National Aeronautic Meeting, Baltimore, Md., May, 1931.

INTERNATIONAL ACETYLENE ASSOCIATION—34th annual convention, Congress Hotel, Chicago, Nov. 12-14. A. C. Morrison, 30 East 42nd St., New York.

NINTH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING—In Grand Central Palace, New York City, Dec. 1-6. Charles F. Roth, manager, Grand Central Palace.

WESTERN METAL CONGRESS AND EXPOSITION—Second National, Civic Auditorium, San Francisco, Calif., Feb. 16-20, 1931. Under auspices of A.S.S.T. W. H. Eisenman, secretary, 7016 Euclid Ave., Cleveland, Ohio.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine tool business

NEW ENGLAND

It appears now that the present level of machine tool distribution will continue with little fluctuation for the balance of the year, probably longer. Apparently builders have not taken optimistic expressions concerning other lines of endeavor seriously. Certainly enough actual improvement has been made to warrant freer buying from these sources. Aside from a short September spurt, there has been no tool progress.

New orders are of the single-machine variety. The Readville shops of the N. Y., N. H., & H. R.R. will resume operations with 1,300 employed. Grinding machine orders continue to fall off with foreign orders representative of almost the entire demand. Small tool orders are only fair.

CLEVELAND

Although the volume of buying of machine tools has slumped in the past ten days, total sales for October equalled those of September. One or two large orders have helped to keep the sales curve on an even keel with last month. A bigger percentage of business was expected, however, because of the large number of inquiries on which prices were quoted. It is the opinion of the trade that a large majority of this business will be held over until 1931. The feature of the recent buying was the list purchased by the Cleveland Electric Illuminating Co., for its new $10,000,000 plant at Ashtabula. Chevrolet purchased two automatics; the remainder of the sales were confined to single tools and replacements.

CHICAGO

While no feature developments were noted during last week, and while orders are still largely limited to unimportant items, an optimistic outlook for the near future prevails among machinery men. Inquiries are not increasing in volume, but more closing of prospective sales is reported than for several weeks. Some of the Western railroads have again put to work a considerable number of shop workers, a favorable augury to concerns which specialize in railroad shop equipment. A slight improvement in automotive and auto accessory production has resulted in a somewhat better demand for such tools. Another factor that makes for a more cheerful outlook is the voting of several million dollars for bond issues to be used in road surfacing, the building of new bridges, and other construction work. Machine tool sales in October about paralleled those for September.

CINCINNATI

The past week's business pie was not very large, but it was so cut that all the machine-tool manufacturers got some. Most of the business booked by manufacturers came from smaller users. Orders were well diversified and well scattered, requirements being largely confined to single pieces. Selling agents closed a few small orders and developed a number of prospects. The week's inquiries were from miscellaneous small users, whose tentative needs were single tools and replacements. As a rule, buying is predicated on the buyer getting a special job which he has in view, and for which he will need the equipment.

CANADA

With the exception of the iron and steel and agricultural implement industries, which are still depressed, conditions in the metal-working field are improving steadily. Considerable activity is noted in used machinery line, and sales of new machinery are increasing. Manufacturers of electrical equipment are maintaining a good volume of output, a feature being the increasing demand for machinery for hydro-electric plants. Aeronautical companies are now collecting winter equipment. Eastern structural steel plants are becoming busier. The Hamilton Bridge Co. reports that enough work is booked, or in sight, to keep the shops working for the balance of the year. Operations of the Robert Mitchell Co. are being conducted at about 78 per cent of normal capacity, with sales showing an improvement over the same period of last year. The St. John Drydock & Shipbuilding Co. has been awarded a contract for fabricating and erecting 230 tons of structural steel for the New Brunswick Electric Power Commission's new steam power plant.

■

SEESAWING continues in machinery and machine tool markets, with the playboys of business teetering between the idea of buying now in forehanded preparation and that of waiting until they are absolutely certain that there is no possible chance to lose. The situation is analogous to that of a small boy wanting to fish in a forbidden pool—though he likes fish he is a little afraid to take a chance, even though he knows the farmer is at the fair, the farmhand is asleep, and the farmer's daughter is ready to go fishing with him.

CANADA, however, seems well on her way to get the fish, for used machinery sales are showing considerable activity and new machinery sales are increasing. A number of markets, including aeronautic, hydro-electric, electrical, structural, steam power, and shipbuilding plants are becoming likely prospects. Chicago's situation is also improving; railroads, automotive, and auto accessory plants adding men and creating some demand for tools. Buffalo itemizes some sales and considers the outlook good.

INDIANAPOLIS industrial activity is picking up, inquiries are increasing, and sales have shown a small improvement. Cincinnati's business pie was divided evenly among the manufacturers and came principally from smaller users. Selling agents met with some success, though most orders are predicated on the buyer's getting an order himself. New England orders are of the single-machine variety, builders expecting little change until after the New Year. Small tool orders are fair; grinding machine orders falling off. New York demand is static, even though the elections are over; only a few dealers report an upturn. Cleveland reports some orders. Detroit, despite Ford, is downhearted again.

BUFFALO

Feeling is considerably better here within the last two weeks. The trend is toward more sales, and industrial executives are doing more talking about purchases than at any time for several months past. One dealer reports the sale of a milling machine and a turret lathe. A second reports the installation of a Monarch 30-in., Model M, 22-foot-bed lathe. Another dealer reports the sale of eight South Bend lathes, 9-in., 11-in., and 16-in., going to various industries. Still another reports the sale of a drill press and a 14-in. lathe.

Another house reports several pump sales, one being a $4,000 vacuum pump, and two others totaling nearly as much. The latter were of the deep-well, centrifugal, type for use in the leather and tanning industry. Several minor sales were also reported and a few sales of used machinery.

DETROIT

The machinery and machine tool trade is still in a serious state of depression, and no signs of an early advance can be noted. October was one of the dullest months of many years. November gives little promise of improvement. Inquiries have fallen off to an unusual degree, and the dealers believe there will be no important projects started this month, perhaps not this year. Two representative dealers expressed the opinion that a more optimistic note has become apparent in the automobile industry and they believe this augurs an improvement, probably about Jan. 1. The only sales of any importance at all in the last ten days were made to a large body plant equipping a plant in England and to one of the largest automobile firms now making some replacements.

INDIANAPOLIS

While there has been little improvement in demand for machinery or machine tools, there are some inquiries and a little more industrial activity. There is still considerable haggling over prices, and the second-hand dealers find this tendency more and more pronounced. More demand appears to be coming from the iron and steel industry. Indications point to better business from this source before the first of the year. Local fabricators of bridge steel and reinforcing steel consider the outlook for the coming year bright.

Right now the demand for all sorts of contractors' equipment is slight, and nothing much is expected until after the first of the year. Demand for paving machinery should be very good next year for the state is preparing to do more paving than ever before.

Some railroad buying is noticed, but the volume is not large and generally is confined to isolated pieces of equipment. Here too, however, there is a tendency toward more business. A fair demand is seen for special equipment for the electric utilities. Demand for heavy machinery from the coal fields has dropped.

NEW YORK

Politically eventful, election week in New York was uneventful for business. The uncertainty regarding state political supremacy was pretty well settled, but little in the way of orders resulted. Scattered dealers report a slight pick-up in both orders and inquiries from sources "from hat builders to subway makers"; the majority see little change from the preceding week. There is a well-defined feeling that little of importance will occur one way or another before the first of the year. Diffident prospects, faced with taking the first few childlike steps toward buying the equipment they will be crying for as soon as the sales curve begins mounting steadily, are hanging back, waiting for a leader—or a nurse—to guide them.

BUSINESS • BAROMETER

Recent investigations afford convincing evidence that unemployment has been exaggerated

THEODORE H. PRICE
Editor, Commerce and Finance, New York

THE elections held in the United States on Nov. 4 attracted world-wide attention. There is a tradition that the country is not so prosperous when the Democrats are in power as it is when the Republicans dominate the government. This tradition is unwarranted. Apparently it goes hand-in-hand with the idea that a high protective tariff is desirable. This may or may not be true, but we have often had good times when the Democrats were in power, and there is no proof that the Republicans have a monopoly of prosperity. It is one of the myths that goes the rounds whenever there is an important election.

In the case of this year's election there is even less justification for it than ever. We had the depression before the ballots were cast, and the Congress that has been elected will not convene until the first Monday in December, 1931, unless President Hoover calls a special session. Therefore the chronology of the future leaves us without anything to fear, at least until December, 1931. By that time it is quite probable that any agitation that the radicals may now be incubating will have been discounted or talked to death and dismissed.

This is the view that prevailed at the close of last week. On Wednesday the market trembled a little when it thought it heard the footsteps of the predatory politicians, but the fear felt did not last long, and by Saturday the various exchanges were going the even tenor of their way. After touching new low levels, the stock market has steadied and the market for bonds shows an upward tendency. The unprecedented ease of money makes it increasingly difficult for the bears to be aggressive, and there is no longer any necessitous pressure to sell.

Some of the commodities declined slightly because "an intimate friend of an intimate friend of an intimate friend of mine" told another friend that cotton would go down if the Republicans went out. A slight decline was the technical vindication of this prediction, but it did not go far, and the demand for contracts under 11 cents a pound seems almost inexhaustible.

Distributive trade in the United States is, upon the whole, good. The mail-order houses report the money value rather than the volume of their weekly sales. Of course, this makes quite a difference and indicates a decrease in weekly sales that is misleading because the lower prices represent a larger volume. In New York and many other large cities the department stores kept open the afternoon of Election Day, and it is asserted that the business done was surprisingly good.

Car loadings continue to run below last year, but the comparisons with the past grow more favorable daily as there was a sharp decrease in shipments commencing with the 30th of November, 1929.

It may take a week or two more for the public to digest the election returns of last Tuesday, but their effect cannot be permanently unsettling, and the spectacle of a great nation going to the polls to settle peacefully the important issues that confront its people is so inspiring that it can hardly fail to exert a worldwide influence.

This observation is prompted by the news from South America in general, and Brazil in particular. There seems to be but little doubt that the questions that trouble our Southern neighbors are being gradually ironed out, and that they will soon be enjoying political as well as economic tranquillity. If this hope shall become a reality the effect upon our trade in the Western Hemisphere will be definitely stimulating, and we will have approached nearer the time when a war in South America will be absurdly anachronistic.

In Europe, as well as in Asia and the Orient, the conditions are not quite so placid as on this side of the Atlantic, but things are commencing to straighten themselves out in India, and friends who have just come from China insist that the government there has more stability than is attributed to it.

Meantime, we shall do well to rid ourselves of the idea that there was anything sinister in the recent election, and devote our energies and intelligence to developing the many opportunities that are open to us in the United States. These opportunities, plus the abundance of capital now available for their development, make hard times an absurdity here. Our troubles are largely imaginary, and some investigations recently made afford convincing evidence that the unemployment has been greatly exaggerated, chiefly because there are many who prefer to be idle in our larger cities than to work in the country where they would be provided with food and lodging. It is, however, unlikely that we will hear so much of unemployment now that the election is over. It was exploited and exaggerated for political needs which are no longer pressing, and it will now be relegated to the barn in which the properties of the political drama are stored.

THE BUSINESS WEEK

November 12, 1930

AS the country impulsively mobilizes its generosity to tide over a hard winter by an improvised dole system and roundabout inflation, business is sliding further into the final stage of depression, under the weight of still unbroken financial fatalism, business inertia, and popular fear. . . . Our preliminary index for the week ended Nov. 1 fell further, from 83.4% of normal to 81.5% last week, reflecting continued relaxation of industrial activity and primary distribution. . . . The strange and disturbing thing about the situation is that those who can least afford to take any chances or make any sacrifice are being exhorted to take the initiative of investing their uncertain purchasing power in business restoration, while those upon whom the real responsibility rests are not taking any. . . . The public is responding to "Buy Now" campaigns and demonstrating the latent consumptive capacity of the market; but neither business enterprise nor financial support are forthcoming to reciprocate this gesture of confidence by supplying the goods, and thereby justifying it through expanding employment. . . . Even the long-suffering step-children of American prosperity—textiles, coal, building, agriculture—are now making the bravest display of energy, courage, and enterprise and doing most to support the family. . . . If we do not leave too much to the public and to them, or leave it too long, this may have its benefits. . . . The unshaken faith of the man in the street, and his irresistible needs, may finally haul our business leaders out of their dug-outs with undignified swiftness before many months.

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THE WEEKLY PRICE GUIDE . . . .

Rise and Fall of the Market

SUSTAINED demand for steel continues insofar as construction and railway requirements are concerned. Automotive, agricultural implement and pipe-line materials are moving in small volume in this week's market. The falling-off in pipe-line demand is all the more noticeable when it is recalled that four months ago, this material held first place. Prices are called steady. This may mean that they are merely dormant, due to lack of a sufficient volume of buying to start a movement one way or the other. Copper appears to be the weakest of the non-ferrous group. Electrolytic in small lots out of New York warehouse, is down ¼c. per lb., to 10⅜c., while scrap crucible, declined ¼c., to 7⅜c., paid by dealers.

(All prices as of Nov. 7, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$16.69@$18.19
Northern Basic	19.89@ 20.39
Southern Ohio No. 2	19.89@ 20.39
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	18.00@ 18.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	14.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	20.00
Virginia No. 2	18.75@ 19.25
Basic	22.29
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	19.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	18.20
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	19.63@ 20.13
Basic	19.63@ 20.13
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.00
Cleveland	4.75
Cincinnati	4.45
New York	4 75@5.00
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	1.90@2.00	3.35†	3.00	3.40†
No. 12	1.95@2.05	3.45†	3.10	3.45†
No. 14	2.05@2.15	3.55†	3.20	3.50†
No. 16	2.15@2.25	3.65†	3.30	3.60†
Black				
Nos. 18 to 20	2.25	3.60†	3.40	3.70
No. 22	2.40	3.75†	3.55	3.85
No. 24	2.45	3.80†	3.60	3.90
No. 26	2.55	3.90†	3.70	4.00
No. 28	2.70	4.05†	3.85	4.15
Galvanized				
No. 10	2.30@2.40	3.65†	3.65	3.55
Nos. 12 to 14	2.40@2.50	3.75†	3.75	3.65
No. 16	2.50@2.60	3.85†	3.85	3.75
No. 18	2.65@2.75	4.00†	4.00	3.90
No. 20	2.80@2.90	4.15†	4.15	4.05
No. 22	2.85@2.95	4.20†	4.20	4.10
No. 24	3.00@3.10	4.35†	4.35	4.25
No. 26	3.25@3.35	4.60†	4.60	4.50
No. 28	3.50@3.60	4.85†	4.85	4.75

*Light Plates. †400 to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. butt	56.14%	43.6%	53.3%	42.3%	57.3%	44.8%
3½ to 6 in. lap	52.72%	40.18%	50.8%	37.8%	53.9%	41.4%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28
8	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

Thickness—Decimal Fractions	B.w.g. and	Outside Diameter in Inches—¼	⅜	½	⅝	¾	1	1¼	1½
		Price per Foot—							
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23	
.049″	18	.17	.18	.19	.20	.21	.23	.25	
.065″	16	.19	.20	.21	.22	.23	.25	.27	
.083″	14	.20	.22	.23	.24	.25	.27	.29	
.095″	13	.21	.23	.25	.26	.27	.29	.31	
.109″	12	.22	.24	.26	.27	.28	.30	.32	
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33	
.134″	10	.24	.26	.28	.29	.30	.32	.34	

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	7.00	6.00	6.15
Hoop steel	3.75†	4.00	3.75†
Cold rolled strip steel	4.95	6.00	6.10
Floor plates	4.85†	5.30	5.00†
Cold fin., round or hexagon‡	3.40	3.65	3.35
Cold fin,, flat or square‡	3.90	4.15	3.85
Structural shapes	3.10†	3.00	3.00†
Soft steel bars	3.10†	3.00	3.00†
Soft steel bar shapes	3.10†	3.00	3.00†
Soft steel bands	3.40†	3.65	3.20†
Tank plates	3.10†	3.00	3.00†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, 3/16-in. thick by ¾-in. wide. †400 to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse—3/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ½, 7.35c. per lb.

METALS

Warehouse Delivery Prices in Cents Per Lb. for Small Lots:

Copper, electrolytic, New York			10.75
Tin, Straits, pigs, New York			29.00@30.00
Lead, pigs, E. St. Louis	4.95	New York	6.00@ 7.00
Zinc, slabs, E. St. Louis	4.40	New York	5.75@ 6.75

	New York	Cleveland	Chicago
Antimony, slabs	10.00@10.50	10.50	10.75
Copper sheets*	19.25	19.25	19.35
Copper wire*	11.25	13.12½	11.87½
Copper, drawn, round*	17.75	17.75	18.25
Copper tubing*	21.62½	21.62½	22.00
Brass sheets, high*	16.62½	16.62½	17.00
Brass tubing, high*	21.50	21.50	21.87½
Brass rods, high*	14.87½	14.87½	15.25
Brass wire, high*	17.12½	17.12½	17.50

*Mill, base.

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%†	24.00@25.00	24.30	23.30
Zinc sheets (casks)	9.75@10.25	11.25	10.11
Solder (½ and ½)	22.75	21.50	20@22

Babbitt metal, delivered in case lots, New York, cents per lb.:

Genuine, highest grade	47.00
Commercial genuine, intermediate grade	34.00
Anti-friction metal, general service	30.00
No. 4 babbitt, f.o.b.	10.00

†F.O.B.

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va.:

	Nickel	Monel Metal
Sheets, full finished	52.00	42.00
Sheets, cold rolled	60.00	50.00
Strip, cold rolled	55.00	45.00
Rods, hot rolled	45.00	35.00
Rods, cold drawn	50.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled	50.00	40.00
Plates	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper	7.75 @8.00	7.25	7.25@ 7.75
Copper, heavy, and wire	7.50 @7.75	7.00	6.75@ 7.25
Copper, light, and bottoms	6.75 @7.00	6.50	6.00@ 6.50
Heavy lead	4.00	4.00	3.00@ 3.50
Tea lead	2.00	2.50	2.00@ 2.50
Brass, heavy, yellow	4.50 @4.75	5.00	4.00@ 4.50
Brass, heavy, red	6.75 @7.00	8.25	6.25@ 6.75
Brass, light	3.50 @3.75	4.00	3.50@ 4.00
No. 1 rod-brass turnings	4.50 @4.75	4.00	4.00@ 4.50
Zinc	2.00	1.50	1.25@ 1.50

TIN PLATES—Charcoal—Bright—Per box:

"AAA" Grade:	New York	Cleveland	Chicago
IC, 14x20	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.13	$0.16	$0.15
Cotton waste, colored, per lb.	.09½	.12	.10
Wiping cloths, washed, white, per lb.	.14	38.00 per M	.14½
Sal soda, per lb.	.01¾	.02	.02
Roll sulphur, per lb.	.028	.03	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.	.098	.125	.108
Cutting oil, about 25% lard, in 5 gal. cans, per gal.	.65	.60	.60
Machine oil, medium-bodied (55 gal. steel bbl.) per gal.	.33	.36	.24
Belting—Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin.ft., per inch of width, for single ply:			
Medium grade	30–10%	30–10%	35%
Med. grade, heavy wgt.	30%	30 –5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.:			
First grade	60%	50–10%	50%
Second grade	60–5%	60– 5%	50–10%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.031	$0.031	$0.0325
Cold fin. shafting	per lb.	.034	.034	.036
Brass rods	per lb.	.1487½	.1562½	.2125
Solder (½ and ½)	per lb.	.2275	.235	.3075
Cotton waste, white	per lb.	.13	.13	.13
Disks, aluminum oxide mineral, cloth, No. 1 6-in. dia.	per 100	4.59	4.59	4.60
Lard cutting oil	per gal.	.65	.65	.65
Machine oil	per gal.	.33	.33	.33
Belting, leather, medium	off list	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs	off list	65%*	65%*	50–10%*

*List prices as of April 1, 1927

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*	$6.03	$6.03	$6.03
Emery cloth*	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†	2.61	2.61	2.61
Cloth†	4.59	4.59	4.59
Fire clay, per 100 lb. bag	.90	.75	.75
Coke, prompt furnace, per net ton	Connellsville,		2.60
Coke, prompt foundry, per net ton	Connellsville,		3.50@4.85
White lead, dry	100 lb. kegs	New York,	13.75
White lead, in oil	100 lb. kegs	New York,	13.75
Red lead, dry	100 lb. kegs	New York,	13.75
Red lead, in oil	100 lb. kegs	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less	65%
Larger, up to 1 x 30-in., full kegs, list less	65%
Less than full kegs or case lots, add to list	10%
Fitting-up bolts: list less	45%
Lag screws:	
Up to ½-in. x 6-in., list less	65%
Larger, list less	65%
Less than full keg or case lots, add to list	10%
Rivets:	
Structural, round head, full kegs, net	$4.50
Structural, round head, broken kegs, net	6.00
Tank, 7/16-in. dia. and smaller, list less	65%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less	65%
Larger, up to 3-in., list less	65%
Less than keg or case lots, add to list	10%
Washers:	
Wrought, full kegs, per 100 lb., list less	$4.00
Wrought, broken kegs, per 100 lb., list less	2.00
Turnbuckles:	
With stub ends, list less	20–10%
Without stub ends, list less	55%
Chain:	
Proof coil, base, per 100 lb., net	$8.50
Cast iron welding flux, per lb., net	.35
Bronzing flux, per lb., net	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Colo., Denver—Standard Steel Stamping Co., 130 West Louisiana Ave., No. 2 Bliss power squeezer, No. 3 Bliss double seamer, No. 39 Bliss horn press with duplex, Bliss combination beading and flanging machine for 20 ga. drums 16 in. diameter by 20 in. long or other make of same capacity.

La., Rayville—Richland Parish School Board —manual training equipment for proposed 1 story high school. Estimated cost $175,000.

Mass., Boston—Dept. of Schools—will receive bids until Nov. 17 for metal working lathes for Brighton High School.

Mass., Cambridge (Boston P. O.)—New Method Die & Cut-Out Co., 30 Cross St.—24 in. exhaust fan, 550 v., 3 ph., 60 cycle.

Mass., Jamaica Plain (Boston P. O.) — H. Bettoney, 106 Chestnut St.—band saw, circular saw, sander (barrel), shaper and jointer with a.c. motors.

B. C., New Westminster—Fraser Valley Tie & Timber Co.—interested in prices on complete equipment for sawmill, destroyed by fire. Loss $70,000.

Ont., Fort William—Bd. of Education, W. W. Southon, Secy.—interested in prices on complete equipment for machine shops, etc., in proposed 3 story, 175 x 200 ft. technical school. $411,875.

Opportunities for Future Business

Calif., Los Angeles—Western Metalcrafts Co., 2033 West 16th St., awarded contract for a 1 story, 100 x 100 ft. plant and 50 x 60 ft. office. Estimated cost including equipment $50,000.

Calif., San Diego—Bureau of Yards & Docks, Navy Dept., plans the construction of a metal aircraft structures shop.

Calif., San Francisco—Bd. of Education, will soon receive bids for the construction of a 3 story junior high school including vocational training shops, etc. at Noe and 25th Sts. Estimated cost $650,000. Crim, Resing & McGuinness, 488 Pine St., Archts.

Calif., Sausalito—Italian American Motors Co., 604 Montgomery St., San Francisco, will build a 1 story boat and motor plant here. Estimated cost $40,000. Work will be done by day labor. Former bids rejected. Noted Oct. 23.

Conn., Bridgeport—Moore Special Tool Co., had plans prepared for a 35 x 70 ft. addition to plant. Estimated cost $15,000. Machine shop equipment will be purchased later.

Ill., Pekin—O. L. Cottingham, 420 Elizabeth St., awarded contract for a 1 story, 70 x 95 ft. garage. Estimated cost $40,000.

Ind., South Bend—South Bend Bait Co., awarded contract for the construction of a 1 story, 100 x 100 ft. factory at 1108 South High St. Estimated cost $40,000.

Kan., Abilene—United Light & Power Co., awarded contract for a 1 story, 40 x 100 ft. and 48 x 140 ft. automobile service building, garage and repair shop. Estimated cost $40,000. Noted Sept. 11.

Me., Augusta — Augusta Motor Sales Co., Powhattan St., will build a 2 story, 70 x 100 ft. service garage on State St. Estimated cost $50,000. Edwards Sales Co., 443 Congress St., Portland, Archts. Work will be done by day labor.

Me., Augusta — State Street Realty Co., awarded contract for the construction of a 2 story, 120 x 130 ft. service garage on State St. Estimated cost $100,000.

Mass., Beverly—Atlas Coil Spring Co., recently organized, plans a factory for the manufacture of steel springs.

Mass., Watertown — J. W. Greer Co., 119 Windsor St., Cambridge, Mass., has work under way on the construction of a plant for the manufacture of bakers' and confectioners' machinery and parts, here. Estimated cost including equipment $100,000.

Mass., Falmouth—J. L. Nickerson, Main St., will build a 1 story service garage on Hadden Ave. Estimated cost $40,000. Private plans. Work will be done by separate contracts.

Mass., Lawrence—Morehouse Baking Co., 9 Mill St., awarded contract for a 1 story, 70 x 170 ft. garage at Jackson and Methuen Sts. Estimated cost to exceed $40,000.

Mass., Norwood—Jenney Mfg. Co., 291 First St., South Boston, awarded contract for a 1 story service station at Railroad Ave. and Washington St., here. Estimated cost $50,000.

Mass., Pittsfield—General Electric Co., E. A. Wagner, Gen. Mgr., awarded contract for the construction of a 1 story, 150 x 550 ft. transformer tank shop on Tyler St. Estimated cost $1,000,000.

Mo., Eminence—Shawnee Copper Mining Co., plans the construction of a new concentrating plant. Estimated cost including equipment $100,000.

Mo., St. Louis—Flexwood Co., 919 North Michigan Ave., Chicago, Ill. and c/o R. E. Pickrel, 4025 Clara Ave., St. Louis, is having preliminary plans prepared for the construction of a veneer factory at Clara Ave. and Terminal Belt Line. Estimated cost $250,000.

Mo., Springfield—International Harvester Co. of America, 606 South Michigan Ave., Chicago, Ill., is having preliminary sketches made for the construction of a service building and warehouse, here. Estimated cost $100,000.

Mont., Polson—Phoenix Utility Co., is building a machine shop in connection with power project work on Flathead River.

N. H., Manchester — H. E. Hartman, 11 Prospect St., is having revised plans prepared for a 2 story, 110 x 170 ft. repair and service garage on Elm St. Estimated cost $75,000. A. O. Osberg, 508 Manchester St., Archt.

N. J., Camden—Reeves Stove & Foundry Co., 22nd and Hayes Sts., plans to rebuild foundry destroyed by fire.

N. J., Elizabeth—Fisher & Dackerman, 1153 Chestnut St., is having revised plans prepared for a 1 story addition to factory for the manufacture of automobile bodies. Estimated cost $40,000. W. L. Finne, 1201 East Grand St., Archt. Former bids rejected.

N. J., Newark—Schwartz Bros., 263 Lafayette St., awarded contract for the construction of a 1 story, 100 x 150 ft. garage and warehouse on Rome St. Estimated cost $150,000. Noted Oct. 16.

N. Y., Buffalo — S. & E. Heating & Sheet metal Works, 32 Roetzer St., is having plans prepared for a 1 story addition to metal and tin-working shop.

N. Y., Brooklyn—Donigan & Nielson, 3rd Ave. and 24th St. (manufacturers of automobile bodies) awarded contract for the construction of a work shop. Estimated cost $40,000. Noted Oct. 23.

N. Y., Brooklyn—M. Kessler, 211 West 106th St., New York, postponed 73 x 117 ft. service garage at Hart Pl. and West 16th St. here. $60,000. M. Klein, 65 Court St., Archt. Project in abeyance until Spring. Noted Sept. 11.

N. Y., Brooklyn—One Thousand Eight Pitkin Corp., A. W. Norek, Pres., 66 Court St., is having sketches made for a 4 story service garage, etc., at Pitkin Parkway and Eastern Parkway. Estimated cost to exceed $75,000. H. J. Nurick, 44 Court St., Archt.

N. Y., New York—H. Mandel, 10 East 40th St., will build an 8 story garage at 408 West 25th St. Estimated cost to exceed $150,000. Farrar & Watmough, 10 East 40th St., Archts. Work will be done by separate contracts.

N. Y., New York—Realty Utility Corp., F. A. Shaw, Pres., 122 East 42nd St., plans a 75 x 173 ft. service garage at Jerome Ave. and 196th St. Estimated cost to exceed $40,000. N. Rotholz, 122 East 42nd St., Archt.

N. Y., New York—Seven Hundred and Ten 12th Ave. Corp., N. Wallenstein, Pres., 33 West 42nd St., plans the construction of a 3 story, 200 x 225 ft. service garage at 643 West 51st St. Estimated cost $200,000. W. Shary, 22 East 17th St., Archt.

N. C., Charlotte—Charlotte Pipe & Foundry Co., plans rebuilding part of plant destroyed by fire, also to extend former unit for increased capacity. Estimated cost including equipment $100,000.

O., Cincinnati—C. R. Talbott, 2245 Bogen St. (iron and steel) awarded contract for a 1 story factory and office. Estimated cost $75,000.

Okla., Oklahoma City—Fluid Packed Pump Co., 29th and Santa Fe Sts., awarded contract for the construction of a 2 story, 24 x 136 ft. factory. Estimated cost $50,000.

Ore., Astoria—A. Lindstrom (boat building and repair work) had plans prepared for a 1 story repair shop. Estimated cost including equipment $20,000.

Ore., Roseburg — Oregon Hardwood Lumber Co., plans the construction of a complete saw mill, planing mill and factory.

Pa., Altoona—Goodrich Tire & Rubber Co., W. B. Thompson, 500 South Main St., Akron, O., will soon award contract for a 1 and 2 story, 49 x 163 ft. service station, garage, etc. at 12th and 16th Sts. here. Estimated cost $40,000. Private plans.

Pa., New Castle—Blair Strip Steel Co., G. D. Blair, Jr., Pres., awarded contract for rebuilding steel plant 1 story, 50 x 250 ft. at Butler Ave. Ext. destroyed by fire. Estimated cost $500,000. Noted Oct. 23.

Texas—Texas & Pacific & Northern Ry. Co., (subsidiary of Texas & Pacific Ry. Co., Dallas) is having preliminary plans prepared for construction of and equipment for machine and repair shops and engine houses located at designated points on the route of the new 333 mi. extensions to be built here. Estimated cost $250,000. E. F. Mitchell, Dallas, Ch. Engr.

Tex., Perryton—City Council, plans the construction of a municipal airport near city limits to include hangar, repair shop, etc.

Wash., Everett—G. Fengler, has established Bayside Boat Building Co. and plans a machine shop in connection.

Wash., Port Orchard — South Kitsap Union High School, had plans prepared for an automotive building, housing machine shop and other facilities.

Wash., Seattle—Anderson Bros. Machine & Iron Works, capital $15,000, has been incorporated by Hovey & Anderson, 1208 Alaska Bldg., Attorneys.

Wash., Seattle—Apex Sheet Metal Works, 2330 14th Ave. N., is building a sheet metal shop at 912-16 12th Ave.

Wash., Seattle—Emmett Wrench Co., Securities Bldg., has been incorporated to engage in the manufacture of a patented wrench.

Wash., Seattle—A. Kahn, 1000 Marquette Bldg., Detroit, Mich., Archt., will receive bids until Nov. 17 for the construction of a 1 and 2 story automobile assembly plant here for Ford Motor Co., 3674 Schaefer Rd., Dearborn, Mich. Estimated cost $750,000.

Wash., Seattle — Publix Garage, Inc., c/o Shack & Young, Central Bldg., Archts., received lowest bid for the construction of a 5 story, 116 x 141 ft. garage at 6th and Union Sts. from E. S. Booker, 4626 21st Ave. N. E. $142,171.

Wis., Milwaukee—Weimer Welding & Cutting Co., 309 4th St., awarded contract for a 1 story, 25 x 100 ft. addition to shop.

Ont., Gravenshurst—Rainbow Craft Ltd., T. Greavett, Gen. Mgr., will soon receive bids for the construction of a factory and shops for the manufacture of motor boats. Estimated cost $100,000.

Ont., Sandwich—British American Oil Co., Ltd., Royal Bank Bldg., Toronto, awarded contract for an oil storage and distribution station including 48 x 130 ft. warehouse, 60 x 80 ft. garage, storage tanks, etc. here. Estimated cost $100,000. Noted Sept. 11.

Ont., Toronto—Sangamo Electric Co. of Canada Ltd., 179 George St., awarded contract for a 2 story, 40 x 100 ft. addition to factory. Estimated cost $50,000.

Que., Montebello—W. T. Owen, plans the construction of a wood mill. Estimated cost $75,000.